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ABSTRACT

As background for its fifth meeting, Ocotillo, the faculty-driven think tank for instructional technology issues of the Maricopa Community Colleges (Arizona), presents reports from its working groups for 1991-92. The groups explore the uses and development of educational technology, particularly in the community college setting. The reports are: (1) "Access" (Joe LeCluyse and Yolanda Penley); (2) "Intellectual Rights" (Mary Lou Mosley and Jan Bradshaw); (3) "Discipline Dialogues" (John Mildrew and Maria Harper-Marinick); (4) "Instructional Computer Conferencing" (Karen Schwalm and Shirley Lowman); (5) "Video Conferencing Network" (Norman Jenson, Janet Whitaker, and Jamie Cavalier); (6) "Library Users Group" (Debbie Anderson and Bob Davidson); (7) "Open Entry/Open Exit" (Maria Hesse and Virginia Cantu); (8) "Support for Technologies" (Patricia Harris and Debbie Krumtinger); and (9) "Standards" (Mannay Griego, Juan Marquez, and Don Shehi). (SLD)

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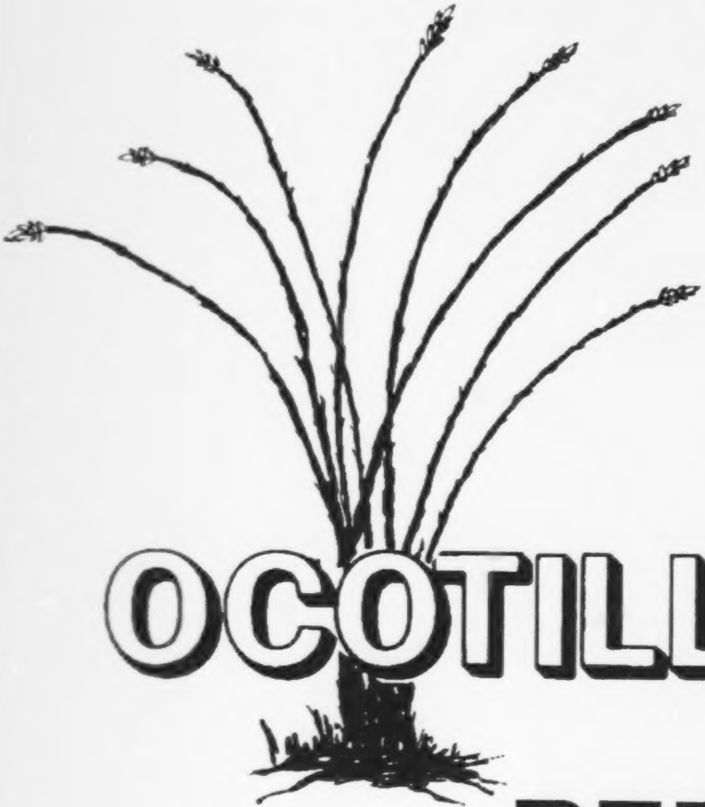

OCOTILLO

REPORT

1991-92

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
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Improving Learning Through Technology

IR016198

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At this, the fifth meeting of the faculty and staff of what is now **Ocotillo**, we continue to make progress in our search for ways to make the best use of technology to improve the quality of the teaching/learning process.

Some of the questions that I asked in 1988 continue to be refined and changed as our institutions grow and evolve, as the technology changes, and as our own expertise develops.

It seems as if every time we have an answer to a question, another set of questions arise. This is what makes **Ocotillo** exciting.

Now we need to find ways of assessing better the work we have done to date and to plan our work for the next five years.

This **Ocotillo** retreat will lay the foundation for our continuing efforts.

Muchas gracias,

Alfredo G. de los Santos Jr.
Vice Chancellor for Educational Development

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Chair's Summary

by Toni Rodriguez

As faculty chairperson for this year, it has been exciting to participate in the active discussions that have resulted in the excellent projects and recommendations published in this report. **Ocotillo**, the faculty-driven "think tank" for exploring instructional technology issues, succeeds in accomplishing its purpose as it:

- studies issues
- makes recommendations
- draws people in to accomplish goals

The success of **Ocotillo** is phenomenal, given its diverse nature. Like the plant from which it takes its name, the **Ocotillo** groups branch out in many directions. But in the end, all group activity is synergistic, producing a whole that is greater than the sum of its parts. In observing **Ocotillo** over the past year, I believe it continues to flourish and grow because at its roots is commitment to three major principles.

First, each group has a commitment to achieving student satisfaction through quality teaching and learning processes. Although groups have a different focus, all work to align their activities to support teaching and learning. This major commitment to student satisfaction, through quality education, is greater than individuals or circumstances.

Second, each group is committed to identifying the most effective and reliable methods for achieving quality education. **Ocotillo** brings together all people involved in the process of instruction. Therefore, the goals and mission of the District are accomplished through collaboration rather than competition.

Last, each **Ocotillo** group seeks continued improvement for itself and for the organization. With Ocotillo's threat-free environment for problem-solving, problems can be viewed as an opportunity for improvement. In this way, solutions revolve around fixing the process rather than attacking the individual elements involved.

The success of **Ocotillo** is not a chance occurrence. It is the result of hard work and a commitment to the principles identified. Although the look of **Ocotillo** may change from year to year, it will always seek to formulate the questions that need to be addressed in the future.

I want to thank everyone who contributed to the continued success of **Ocotillo** this year. Your creativity and wisdom are reflected in the reports that follow, but what I remember most is your spirit.

Preface

by Naomi O. Story
Ocotillo Project Manager

The tone and mood for **Ocotillo** in 1991-92 have been positive and productive. Faculty chairs and district support staff have worked closely and enthusiastically to define and to address committee goals throughout the year as demonstrated in the following document.

The year began with a "kick-off" luncheon at the Holiday Inn involving the faculty chairs, district support staff, and Deans of Instruction. Dr. Alfredo G. de los Santos Jr., Vice Chancellor for Educational Development, provided the impetus and framework for **Ocotillo** to the group. Toni Rodriguez, faculty at GateWay Community College and **Ocotillo** Chair, focused on the teaching and learning issues that would be the "conscience" and driving force for each committee discussion.

A strong effort was made this year to inform people about **Ocotillo** and its progress. Maricopa Center for Learning and Instruction (MCLI) staff:

- produced three **Ocotillo** *Rags*, which updated faculty, administrators, and staff about committee discussions and issues
- developed an **Ocotillo** brochure to:
  - highlight the purpose of **Ocotillo**
  - identify the committees and their goals
- provided articles and materials related to specific technology issues to committees throughout the year as "food for thought"

The individual committees varied in discussion, size, and composition. Diverse backgrounds in discipline and function helped to promote a wide range of vision and philosophy among the committee members. Several of the committee chairs were new to the **Ocotillo** task force, promoting:

- different and new ideas and points of view to bubble and flourish
- more participation among instructional technology leaders

Through her leadership and commitment, Toni Rodriguez participated in several committee meetings. She also acknowledged the need to bring back the Technology Expo which will occur in the fall of 1992 to showcase faculty's instructional applications of technology. Chair Rodriguez has also organized the Retreat Planning Committee for the upcoming **Ocotillo** Retreat. Plans include:

- assessing the status and accomplishments of the district in terms of technology and learning
- looking at the future of **Ocotillo** issues and concerns for next year

ACCESS

By: Joe LeCluyse, PVCC
Yolanda Penley, CGCC

Charge:

Facilitate the provision of learning opportunities to a broader group of learners by promoting easy and equitable access to technological advancements for the dissemination of information and delivery of academic programs and services.

Committee Members

Jan Baltzer, DIST	Shirley Petras, GCC
Ed Chandler, PVCC	Mike Rooney, DIST
Betty Elliott, RSCC	Linda Rosenthal, DIST
Lee Garza, CGCC	Jeannie Wyatt, SCC
Catherine Osborn, DIST	

Introduction

During 1989-90, the Ocotillo Access committee addressed a number of issues related to access. These issues fell under the primary headings of:

- Full Access to Information
- Student Access
- Faculty, Staff, and Administrator Access
- Access to External Institutions and Systems
- Effectiveness Measures

Access was not addressed in the 1990-91 Ocotillo committee structure, but was resurrected this year so that we do not lose sight of this growing issue as it relates to information and technology in the teaching and learning processes.

Goals

The committee initially agreed that what we are really looking at is the information process. Information is both a resource and commodity while technology is a medium by which we are able to share this resource. From this perspective, the committee identified the following tasks to attempt this year:

- Identify the information and technology that are available or in development in MCCCD
- Identify how to share the information within the MCCCD colleges
- Identify any Governing Board actions that are needed to provide access to information and technology
- Identify issues and recommendations regarding student access to information, services and technology
- Identify alternative sources of revenue to provide funds to continue to implement and update instructional/information technology
- Identify what currently exists in terms of training and its effectiveness from the access viewpoint

Year In Review

In addressing our first task, to identify the information and technology that is available or in development in the MCCCD, we received presentations from the following individuals:

- Judith Leslie and Richard Barber - "Developments of The Robinson Group"
- Lionel Martinez, Deborah Krumtinger and Naomi Story - "Training of Technology Use within MCCCD"
- Jan Baltzer - "Access to MCCCD Information"
- Mike Rooney - "Technology Implications of the Board-Approved Advisement Policy"

Significant information gained from these presentations is briefly reviewed below.

Developments of The Robinson Group

The mission of the partnership between The Robinson Group and MCCCD is to "enhance institutional effectiveness through the use of technology by empowering students, faculty, and administrators with an information resource that can be accessed easily for use in instruction, management, planning and decision making." Software solutions to date include:

1. Campus Information System (Kiosk): A program through which students can gain information on: student records, course and program information, admission information, calendar of events, schedule of classes, financial aid, student activities and services, employment information, library information, campus maps, etc.

2. Student Tracking System (Insight): A system that provides information to faculty and advisors about select student populations such as at-risk students from kindergarten through higher education.

3. Administrative Almanac (Almanac): A system that extracts data from existing databases and summarizes trend information in three forms: graphs, spreadsheet, and annotated description.

4. Faculty Support System (INFORM): A system that assists faculty and students to manage their courses and instruction. Students have immediate feedback on their status in a course and can check their status instantly. Faculty can more easily track their students' progress in a course. INFORM aids retention by automatically generating letters of follow-up on a student's progress. This is particularly useful for open-entry, open-exit courses.

Issues discussed included individual college "readiness" to implement these software options and possible restraint of access to these options at smaller colleges due to a lack of resources.

Training for Technology Use within MCCCD

There is a perceived situation that within MCCCD about 20% of faculty and staff are able to keep up with changes in technology and about 80% are either not able to or not interested in it. The Information System Support Task Force (ISSTF) has been established to attempt to close that gap. ISSTF set out to find out what was out there with regards to using technology and who knew what. They also wanted to find out how training services could be brought in at the development stage to better plan the training process.

A major problem mentioned was the gap between the use of technology and training and the lack of well-written printed materials to help fill in the time gaps between actual training and use of the systems.

A problem cited regarding training sessions was that often work priorities and supervisors do not allow time to attend the training sessions as scheduled.

Another problem discussed was the lack of standard software packages being used across the district. Therefore, we depend on our colleagues who know how to use the technology to train us as we work along. Due to time constraints this usually results in lack of extensive knowledge of the software, if much knowledge at all.

These issues all result in a problem of time and resources on the part of those responsible for training.

Access to MCCCD Information

Application programming groups within Informational Technology Services (ITS) currently are divided as: Institutional Access (IA), Student Information System (SIS), Human Resources System (HRS), Financial Resources System (FRS), and the many subsystems within these groups. There are currently over 40 "user groups" that advise ITS on the application systems in use.

The main components of ITS are: Technical Operations; Wide Area Network (WAN) Operations; Computing and Communications Center; Telecommunications; Library Technical Services; Video Conferencing Network (VCN); and Research and Development.

Currently, ITS is reassessing its purpose and orientation to provide a more "horizontal" approach, a team approach, rather than the "vertical" approach that has been used in assisting the users. In other words, how can you help the users with systems you currently have and what needs to be developed for them to access information? In addition, the reorientation has included the student as a user. The goal is to develop a system that puts the student in the middle and looks at what the student needs and what is required to support these needs.

ITS is also researching the "state of the state." The agenda for this research includes:

- Research - what exists out there that can help people get the job done?
- Literacy - let people know what they can do with what is out there.
- Network - the training implications as hardware platforms change.
- Software - develop new products through a "rapid prototyping process that allows the user to work with the programmer as the product is developed.

With this information ITS hopes to move more effectively in development of the system described above.

Another issue being considered is "access to the systems." For example, currently voice processing is not used to its utmost throughout the district. There is a lack of literacy in this area.

Literacy seems to be the primary issue.

Technology Implications of the Advisement Policy

The advisement policy was developed based on the assumption that technology would be available. The following implications exist for development of new technology to assist in carrying out the intent of the academic advising policy:

1. In order for students to meet their educational goals they must be provided with an adequate inventory of computers and relevant software so that they and academic advisors can access needed information. Training is a critical issue.

2. Automated access to advising information must continue to be developed, such as an on-line communication system. In addition, information must be available district-wide and on a timely basis. Interactive technology is needed to provide orientation and program planning information to students. In addition, preparation for computerized assessment testing is needed.

3. In order to provide feedback to the institution and the district from the advising process, advisors need to be able to make use of research.

Again, training was pointed out as a critical and major issue.

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Discussion

At the conclusion of these presentations the following topics were discussed:

Three levels of users. Those who need the information available through technology need to find ways to access the information that is available which they need to do their jobs. In considering this issue, we must recognize that there are three levels of users: the more sophisticated user who gets into institutional research using programs that can deal with large databases such as SPSS; the middle level user who can extract data from large databases using the program "Focus"; and the lower level user who just "looks up" data from databases.

Policy issues. Are there any issues we have addressed that require board action? As the 1989-90 Access report suggested, "There is a need to develop an over-arching broad policy statement by the Governing Board regarding the infusion of technology into Maricopa's programs and services." The committee is still in agreement with this sentiment. Also, perhaps we are ready to have a board policy that addresses the issue of who owns the databases and who should have the information available. The question of legal rights, the privacy act, and security may require broad policy statements from the Board.

Resource needs. The problem of information access is compounded by the fact that the more access we have the more we want information. It was noted that as more and more people are given access, we begin to strain the resources. For example, more and more courses are requiring the use of computers, yet we do not increase the dollars needed to add more computers. We are barely able to keep up with the changes in technology. Another example cited was the use of the electronic forum on campuses. As more and more students were allowed access to the electronic forum, the colleges' VAX systems were pushed to the maximum often bringing work to a standstill during peak periods. Part of the problem discussed above is a training issue. People who schedule classes and expand access to computing resources need to be informed about peak user times, resources available to support the expanded use, and other implications of expanding access.

The issue continues to focus on the need to provide more dollars to support our computing needs. If the bond initiative is approved by the voters, the question becomes just how long will we be able to cover the costs of keeping up with new technology and expanded access to more and more users. In addition, dollars must be included in the budgets to cover training issues. Information literacy becomes a priority as the dollars become shorter and shorter. We must give our human resources the training and tools needed to work "smarter."

One option that the district is currently using is "tie-in" purchase agreements whereby we agree to purchase equipment or systems but link training as part of the purchase agreement.

Accountability. Another issue is that of accountability. The North Central Association (NCA) also is putting more and more demands on the district in terms of needing institutional research to report assessment of academic achievement. Unfortunately, one of our problems is that we have a multi-college system, and that introduces the multiple of 10 factor which significantly increases costs.

Access priority. The key issue throughout the committee's discussions was:
All employees of MCCCD have a right to

- have access to information needed
- technology to get the information
- training that will provide access to information that is needed to do their jobs.

This implies that we must have sufficient resources--human resources, fiscal support, as well as equipment to ensure that people can have access to information. Students, too, have a right to access information needed and technological tools to meet their educational goals and to develop themselves as individuals.

What is needed now is a plan to help achieve the goals described above.

Conclusion/Recommendations/Future Goals

This committee has found that there exist issues regarding "access" of information through technology that need immediate attention if the teaching and learning process is to reach higher levels of effectiveness for students, faculty, and staff. These issues are:

- institutional research
- information literacy/training
- user access to information
- user access to technology
- communication within the district
- Governing Board action

The committee noted that a number of the recommendations from the 1989-90 Ocotillo Access committee have not been addressed. In the following recommendations we have named parties we suggest be assigned the responsibility for leadership toward achieving the recommendations. This is for no other reason than to move these recommendations along to completion. If the recommendations are deemed high priority, action should be taken upon them. If they are not considered high priority, this needs to be communicated to faculty, staff, and students so that we may establish the "acceptable" level of access.

Governing Board Action

1. Develop an over-arching broad policy statement by the Governing Board regarding the infusion of technology into Maricopa's programs and services (reference 1989-90 Access report). A policy statement suggested:

   All employees in MCCCD have a right to have access to the information necessary to do their jobs, access to technology to obtain that information, and access to training necessary to use both the technology and the information obtained using the technology.
   All students within the MCCCD have a right to information and technology tools necessary to develop themselves as individuals and to meet their educational goals.
   Sufficient fiscal and human resources need to be allocated in order to insure that these needs are met.

2. Develop a Board policy that addresses the issue of database ownership and access.

3. Address three other issues that may require Governing Board policy statements:

   - legal rights
   - the privacy act
   - security

Institutional Research

Organize the institution's data into an institutional research database along with a variety of user interface tools that allow faculty and staff to access the information in an easy and consistent manner. Responsible party: Information Technology Services (ITS).

Information Literacy/Training

1. Develop a program of "information literacy" to take up where the previous "computer literacy" effort left off. This should be developed and implemented for students, faculty and staff. Responsible party: Training Services.

2. Provide ongoing training for the institutional research database and ongoing training in data interpretation. Responsible party: Training Services.

3. Use a multifaceted approach to training which recognizes individual as well as group needs and preferences. We recommend the purchase or development of self-paced tutorial training methods. These need to be updated on an ongoing basis. Responsible party: Training Services.

4. Include Training Services in the rapid prototype development method. Responsible party: Training Services and ITS.

5. Expand the use of electronic communication tools such as Electronic Forum, INFORM, Bitnet, Internet, and others to give students, faculty, and staff access to other individuals throughout Maricopa county and the world. Responsible party: Training Services and ITS.

User Access to Information

1. Establish a centralized clearinghouse where information about existing technologies, applications and user groups can be accessed. Responsible party: Information Systems Support Task Force (ISSTF).

2. Expand the number and type of on-line databases available to students, faculty, and staff. Responsible party: ITS.

User Access to Technology

1. Create a review system at the college level that ensures a balance between courses requiring access to technology and the availability of technology to students, i.e., lab availabilities vs. lab demand. Responsible party: Deans of Instruction and Deans of Occupational Education.

2. Develop or purchase new administrative computing systems (i.e., SIS, FRS, HRS) that are user-centered and provide easier access to information for students, faculty, and staff. Responsible party: ITS and Individual Colleges.

3. Expand and/or upgrade current telephone and voice mail systems to:

   - provide wider use of integrated voice response technology to give students, faculty, staff, and the community touchtone access to information
   - provide students, faculty, staff, and the community with a mechanism for interacting with administrative and instructional databases (i.e., expanded touchtone registration, flex benefits selection, requests for information, etc.).

   Responsible party: ITS and Individual Colleges.

4. Expand and enhance the Video Conference Network (VCN) and VCN locations at the colleges to give students access to courses and resources from one college location to another that might otherwise not be accessible. Responsible party: ITS and Individual Colleges.

5. Continue to expand the local area networks at the colleges and the MCCCD wide area network for maximum connectivity of individuals to individuals and individuals to sources of information. Responsible party: ITS and Individual Colleges.

6. Additional use of technology is needed for the delivery and evaluation of programs and services to diverse populations requiring greater support for academic success (reference 1989-90 Access report). Evaluate current systems as to how they meet needs. Responsible party: Advising Council.

7. There is a need to provide easier access to information for all employees across colleges to assist them in achieving excellence in their job performance (reference 1989-90 Access report). Responsible party: ITS.

Communication Within the District

1. Compile a district wide inventory of programs or reports that have been developed at individual campuses. Responsible party: ISSTF.

2. Develop more specific standards for the selection, acquisition, and utilization of hardware and software. (reference 1989-90 Access report) Responsible party: ITS.

Future Goals

1. Develop a process to manage the change inherit in opening up greater access to information and technology. Responsible party: Ocotillo Access Committee.

2. Develop an ongoing evaluation of access to technology and information to assess implementation effectiveness for each recommendation and ensure that the goal of effective teaching and learning through the assistance of technology is attainable (reference 1989-90 Access report). Responsible party: Ocotillo Access Committee.

INTELLECTUAL RIGHTS

By: Mary Lou Mosley, PVCC
Jan Bradshaw, DIST

Charge:

Examine the impact of the Federal Copyright Law on the educational community, specifically relating to the rights and responsibilities of faculty and staff in the use and reproduction of print, video, audio, and computer software.

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Committee Members

Mary Briden, PC
Georgia Dillard, PC
Richard Felnagle, MCC
Pat Greer, RSCC
Frank Gonzalez, MCC
Shirley Lowman, DIST
Bill Martin, SCC
Willie Minor, PC
Charlotte Montanus, GCC
Mike Morgan, SCC
Phil Pepe, PC
Don Richardson, PC
Ken Roberts, PVCC
Ginny Stahl, SCC
Jean Staten, GCC
Johnette Williams, GCC
Ted Wolter, CGCC

Introduction

Description of Charge and Purposes

New to Ocotillo this year, the Intellectual Rights group will examine the impact of the Federal Copyright Law on the educational community. Included in the study will be rights and responsibilities of faculty and staff in the use and reproduction of printed and video material as well as computer software. Also under discussion will be the ownership rights of employees who author materials in the workplace.

As a new committee this year, the Intellectual Rights members focused their time and energy on the following purposes:

- to define the issue of "Intellectual Rights"
- to identify "hot" issues or topics for more in-depth study
- to gather data and information about the "hot" issues
- to recommend solutions and/or future directions

Definition of Intellectual Rights

The committee defined "intellectual rights" as

> *those rights and responsibilities involved in the use, development, and/or reproduction of printed matter or software (including video, audio, and computer media) for instructional purposes.*

The committee members agreed that the Federal Copyright Law was the basis for considering intellectual rights.

MCCCD Copyright Policy

Several years ago, a subcommittee of the Telecommunications Users Group and the Media Directors worked with Janice Bradshaw, MCCCD Legal Counsel, to develop a copyright policy for Governing Board approval and guidelines to assist employees in complying with the

Copyright Law. The Governing Board approved a copyright policy on December 12, 1989, but the guidelines were not completed.

The Governing Board approved a copyright policy that stated MCCCD's intent to

- adhere to the provisions of the U.S. Copyright Law (Title 17, United States Code, Section 101, et seq.)
- prohibit employees from copying materials not specifically allowed by
  - the Copyright Law
  - fair use guidelines
  - licenses or contractual agreements
  - other permission

Year In Review

The Intellectual Rights Committee met for the first time on November 13, 1991 and had its final meeting on March 26, 1992. A summary of its work follows.

Identifying Critical Issues

Committee members spent their initial meeting brainstorming "hot" topics or critical issues in the area of intellectual rights. Some of the issues were

- access vs. censorship
- develop materials with MCCCD equipment
- faculty developing software, video, print
- multimedia limits
- optical scanning & OCR
- ownership of copyright
- pirated software
- site licensing
- taping of faculty lectures
- use of student work
- using A1 as course material
- video network and broadband uses

After the brainstorming session, committee members used their definition of intellectual rights to clarify the issues. Next, they either grouped issues together or eliminated them from consideration for this year.

Three Issues and Subcommittees

The Intellectual Rights Committee identified 3 issues as most important for exploration this year. Committee members volunteered to work on one of the three subcommittees. The issues and the subcommittee chairs and members were

- Copyright Law Guidelines and Incentives
  Richard Feinagle, MCC, Chair
  Frank Gonzalez, MCC

- Development and Use of Multimedia Instructional Materials
  Bill Martin, SCC, Chair
  Mike Morgan, SCC
  Ted Wolter, CGCC
  Mary Lou Mosley, PVCC

- Support for Faculty to Publish Materials (Print and Non-Print)
  Don Richardson, PC, Chair
  Charlotte Montanus, GCC
  Phil Pepe, PC
  Willie Minor, PC

Each subcommittee started with a broad scope of the issue to narrow down and explore. Then, each subcommittee developed recommendations for implementation, further exploration, or referral of the issue to another group. The whole Intellectual Rights Committee reviewed the recommendations and agreed on the final list.

The scope of each subcommittee follows:

Copyright law guidelines and incentives.

- clarify the various aspects of the Copyright Law as it applies to teaching
- assist faculty and staff to understand and apply the Copyright Law
- make adhering to the Copyright Law an easy and positive experience

Development and use of multimedia instructional materials.

- capturing video pictures and clips
- scanning and digitizing
- creating modules that use other software programs
- accessing and altering videotapes, sounds, etc.

Support for faculty to publish materials.

- software and print/nonprint materials
- copyright ownership
- how can the District encourage faculty to develop materials?

Subcommittee Reports

I. Copyright law guidelines and incentives.

(by Richard Felnagle, MCC, March 3, 1992).

- The Problem:
  1. The Fair Use Doctrine is inadequate for the needs of most faculty; faculty want
     - to copy articles and chapters for their own anthologies, handouts, student packets, etc.,
     - to record video programs off-air for repeated classroom and library showings, and
     - to make unlicensed copies of educational software programs available to students and colleagues.

     Therefore, the Fair Use Doctrine is self-defeating; since it is so inadequate, few faculty even make a pretense of compliance or concern.

  2. Policies of intimidation, threats of prosecution, and inconsistent enforcement methods create additional resentment. Most faculty know of no one who has been caught or punished for copyright infringement (except Kinko's). **Therefore**, faculty seem to feel they are too insignificant as individuals to merit attention.

  3. Faculty lack of experience in getting permissions is compounded by the lack of support staff assistance and by rumors of insurmountable obstacles. **Therefore**, faculty would rather run what they perceive to be a virtually nonexistent risk of prosecution in preference to undergoing what they perceive to be the time-consuming ordeal of getting permissions.

- The Solution:
  Convince faculty that their needs can be fulfilled more easily and satisfactorily legally than illegally.

- The Challenge:
  Make compliance with the copyright law more attractive than infringement.

- Information Resources:
  1. General: Virginia Helm, an Assistant Dean at Western Illinois University (309-292-1414), author of *What Educators Should Know About Copyright*, published by Phi Delta Kappa Educational Foundation.

  2. Print: Parker Ladd, director of the Higher Education Division, Association of American Publishers, Inc., and Jim McLaughlin, director of AAP's Pubnet, 220

East 23rd Street, New York, NY 10010-4686 (212-689-0131)

Virginia Antos, Assistant Director for Copyright, Association of American Publishers, Inc., 1718 Connecticut Avenue, N.W. Washington, D.C. 20009-1148 (202-232-3335).

3. Video: AIME, the Association for Information, Media, and Equipment, P.O. Box 865, Elkader, IA 52043 (319-245-1361), funded by a consortium of publishers of educational film and media. (AIME operates the Copyright Hot Line: 800-444-4203).

   Ivan Bender, legal counsel for AIME, 1537 W. School Street, Chicago, IL 60657 (312-248-5069).

4. Software: The Software Publishers Association also maintains a hotline for reporting software piracy and they have an information packet and video available: 800-388-7478.

- Compliance Options

I. Print
  A. After the Kinko's Decision
    1. Publishers were instructed to expedite the process by which academics could obtain permissions for reprints.
    2. Generally, the AAP policy now is to go after campus bookstore and copy centers, not individual faculty; the person who actually makes the copy is more at risk than the person who requests the copy.
  B. Recent Developments
    1. Bookstore-oriented Permissions Services
      a. Follett's Copy Right Press
      b. AAP's Pubnet Permissions
      c. Academic Permissions Service
    2. Publishing-on-Demand Services
      a. Burgess
      b. Primus
    3. Other Options
      a. Greenhaven Press collections
      b. Project Gutenberg

II. Video
A. Trade/Vendor Legal Interpretations
1. The face-to-face teaching exemption allows faculty considerable freedom to use their own legally-obtained tapes in their own classroom.
2. Fair Use permits significant off-air taping by faculty for classroom use in face-to-face teaching situations if
a. the "within ten days one time, possible two time classroom" rule is applied.
b. the tape is destroyed after viewing and evaluation
c. proper usage records are kept
3. Broadband and library uses of legally-obtained video cassettes require broadband/closed circuit licenses. Library/media center/learning center/information commons is a similar place devoted to instruction and covered under the Kastenmeir Guidelines.
B. Recent Developments
1. Video copies of recent broadcasts are becoming readily available. (PBS Video Service is a significant vendor.)
2. Cable-in-the-Classroom provides for extended off-air taping rights for teachers of cable-only services (especially Arts & Entertainment Network, the Discovery Channel, and CNN).
3. Media Center cooperation in arranging for purchase of off-air recordings.

III. Software:
A. Making unlicensed copies of software remains illegal, but Mesa's Information Services office has been very willing to assist with purchases and site licenses.
B. HyperCard and object-oriented programming (authoring) environments hold out the promise of faculty-created custom applications; assistance provided by Learning Assistance Centers at MCC is an added incentive.
C. However, scanner technology and AV products create some concerns that faculty-created applications may contain illegally duplicated materials.

- Conclusion

I. The Good News: Most of the essential support services are already in place at MCC.

A. **Print:** Paul Freeman, manager for Mesa's Follett Bookstore, is eager for duplicating business and, with Follett's connection to the Copy Right Press, seems to have the mechanism in place to handle reprint requests.

B. **Video**: Margie Ferguson, Jan Coolman, Elizabeth Medrano, and Frank Gonzalez have been extraordinarily cooperative in assisting me to handle off-air taping requests, licenses, and purchases and to facilitate student access to materials. Chas Moore has stated that all faculty are required to do is to make requests.

C. **Software:** Mary Alcon and the staff of Information Services have been very willing to accept requests for software purchases and site licenses.

II. The Bad News: Nobody knows the good news.

II. Development and use of multimedia instructional materials. (by Bill Martin, SCC, March 3, 1992).

- Multimedia Definition:

The use of and interaction between various sources of information, such as music, still images, animation, video, synthesized voice and text, controlled by a single source, often a computer.

- Legal Implications:

Any use of the above items that have been created by another individual may be covered under the copyright laws and permission for use should be obtained. Exceptions to this general rule fall under the fair use condition.

Fair Use allows others to use your copyrighted work without your permission. It is permissible to copy a small part of it for criticism and comment, scholarship, research, news reporting, and teaching (including multiple copies for classroom use). If you are unsure whether your proposed use is *fair*, or if you want to do a substantial amount of copying, then you should get permission from the copyright owner. (Blue, 1988)

Courts consider a long list of factors in determining whether a use is "fair." The purpose and character of the use that is claimed as fair use is important. Educational, research, criticism, and news reporting uses are almost always fair; commercial uses, such as uses in advertising, are seldom fair uses. (Wilson, 1990)

This concept is further explained as follows. (Blue, 1988)

I. Acceptable fair uses for educational purposes include
    A. use of a single copy in teaching a class or in scholarly research of
        1. a book chapter
        2. an article from a periodical
        3. a short story, essay, poem
        4. a cartoon, chart, diagram drawing, graph, or picture from a periodical
    B. use of multiple classroom copies (one copy per student in class) of
        1. a complete poem of less than 250 words and not longer than 2 pages
        2. a poem excerpt of less than 250 words
        3. a story, article, or essay of less than 2,500 words
        4. an excerpt from a prose work of the lesser of 1,000 words or ten percent of the work
        5. one cartoon, chart, etc., per book or periodical

II. A teacher **may not**
    A. make multiple copies for classroom use if the work has been copied already for a class at the same institution
    B. make multiple copies of a work from the same author more than once a term or more than 3 times a term from the same collective work or periodical
    C. make multiple copies of works more than 9 times in a term
    D. make an overrun of copies for others
    E. make a copy of works in place of an anthology
    F. make a copy of materials such as workbooks that can be consumed
    G. repeat copies from term to term

The above information is expanded in greater detail in The Copyright Book by W.S. Strong, pages 147-154.

- Current Multimedia Usage:

A limited survey was made of two colleges and Janet Whitaker provided information she was gathering for ITS on multimedia use.

1. SCC and CGCC are doing very little multimedia development, in the full sense of the word, at the present time.

2. PVCC has been developing and using a lot of Macintosh-based multimedia instruction due to their being a member of the Apple Community College Alliance. They also have an IBM-based multimedia Chemistry lab.

3. GCC is under contract with IBM to provide a training program for people in Arizona and the southwest who want to learn multimedia use and development within the Advanced Academic System environment.

4. GCC is planning to propose credit courses and a certificate program in the area of multimedia.

5. PC is using commercial multimedia programs in the library and a few faculty are developing multimedia with HyperCard.

6. MCC has a development area in their Center for Teaching and Learning.

Major concerns across campuses related to intellectual rights are:

1. the copyright issue
2. ownership rights

Of the multimedia work surveyed, most dealt with original material or material that would most likely fall under the fair use concept. As the ability to create multimedia presentations becomes easier, the potential for copyright problems will become greater.

Cited Works:

Blue, M. (1988). Making it legal. Flagstaff, AZ: Northland Publishing.

Strong, W. A. (1990). The copyright book. Cambridge, MA: MIT Press.

Wilson, L. (1990). Make it legal. New York: Allworth Press.

III. Support for faculty to publish materials.

- The Support Subcommittee had limited success in gathering information and, therefore, has recommended that surveys across colleges, universities, and community colleges be conducted next year. **MCLI** did do a literature search on faculty publishing, but little specific information about ownership rights was found.

- As the Intellectual Rights Committee discussed the issue of ownership rights for faculty who develop materials, committee members realized that several questions, including the following, needed to be answered before going further with the topic:

1. who should be defining the problem?
2. who should be recommending a solution?

- After much discussion, the Committee agreed on the importance of the issue and that it needed to be referred elsewhere. The Committee did feel that Ocotillo, next year, could help gather information about what other institutions are doing with ownership rights for faculty who develop instructional materials.

Recommendations

General Recommendations

The Intellectual Rights Committee has several general recommendations as well as specific ones for each subcommittee topic. The general recommendations follow.

- The Intellectual Rights Committee needs to continue next year in order to do the following:

  1. implement the recommendations of the subcommittees including:
     a. appointment of Richard Felnagle (MCC) to chair a working committee that will do extensive development in the areas of Copyright Law guidelines, incentives, and training
     b. focus on the impact that multimedia applications use and development have on Intellectual Rights
  2. study the impact on Intellectual Rights of new technologies in the district such as VCN
  3. investigate what other institutions in the country are doing about ownership issues

- Investigate the impact of intellectual rights on the areas covered by the following Ocotillo committees:

  1. Access
  2. Instructional Computer Conferencing
  3. Library Users
  4. Support for Technologies
  5. Video Conference Network

Subcommittee Recommendations

The following recommendations resulted from the subcommittees' reports to the whole committee.

I. Copyright law guidelines and incentives

Recommendations:

1. Create and distribute district-wide Copyright Law guidelines in 3 separate documents
   a. Richard Felnagle (MCC) should chair a committee to
      - work with Janice Bradshaw in the creation of detailed explanations as guidelines for Document 1
      - develop Document 2 for support staff and Document 3 for faculty
      - develop training and videotape support
      - identify forms and documents that can be put on-line

   b. Document 1 will contain the detailed explanation of the Copyright Law and guidelines for adhering to the law. (J. Bradshaw and committee)

   c. Document 2 will contain the information for support staff to assist faculty in getting copyright clearance. (R. Felnagle and committee)

   d. Document 3 will be a short, simple explanation of how faculty can legally obtain or create photocopies, videos, and software programs that they need for instruction. The emphasis needs to be on simplifying compliance and approaching from the positive view of how and what to do. (R. Felnagle and committee)

   e. The documents and subsequent training will include details such as
      - *College bookstores are willing to obtain permissions to use articles in class specific anthologies, lab manuals, and study packets, to duplicate the anthologies, and to sell them to students.*
      - *Secretaries and other support staff can use standard forms to obtain permissions for repeated uses of articles.*
      - *Staff will be trained to be sure that all "camera-ready copy" includes appropriate copyright notices.*
      - *A/V departments can regularly inform faculty of significant off-air taping opportunities and how to obtain permission for use or obtain a legal copy.*
      - *Only materials with broadband/closed circuit licenses should be shown via broadband or be placed in library/information commons facilities.*
      - *An informational sticker should be attached to all catalogued media to display the licensing information.*
      - *Clarification of copyrights with regards to reproduction of music*

2. The release of these guideline documents needs to be coordinated with an education and training program developed by Richard Felnagle and his committee.
   a. One short program for faculty should focus on the ease of complying and how to rely on college staff for support to
      - create or obtain instructional materials
      - get copyright permission

   b. Another, more detailed program for support staff who will handle faculty requests should be developed.
3. Procedures for obtaining group purchases and site licenses on a cooperative basis within MCCCD need to be developed and aggressively promoted.
   a. software and videos
   b. through the Purchasing Department or ITS Department
4. Each college/center and district office annually should review their budgets and related allocations in order to support purchase of instructional materials in adherence to the Copyright Law and Guidelines.
5. As part of the training program, presentations should be made at the various Deans' meetings (DIs, Administrative Deans, Deans of Students) in order to educate the Deans in terms of the Copyright Law Guidelines and types of support necessary for compliance.

II. Development and use of multimedia instructional materials

Recommendations:

1. Survey all colleges and centers to get a better idea of what is being done in terms of developing and using multimedia materials.
2. Identify copyright concerns and questions.
3. Work with Janice Bradshaw, Richard Felnagle, and his committee to address the concerns identified in number 2 above. Examples of concerns in the area of multimedia and intellectual rights are
   a. *What are our obligations when using scanned images in print and in software modules that are being produced on campus?*
   b. *I want to include the narrative from videodiscs and videotapes as text in my instructional program. What clearances do I need to obtain?*
   c. *With QuickTime on the Macintosh allowing video clips to be included easily in software modules, what obligations do we have if we want to use clips from commercial videos?*
   d. *I want to incorporate sounds and music into my multimedia module. Do I need to get any copyright clearances?*
   e. *Professor P is given a copy of a word processing program by a colleague, who got the program as a gift from someone who works for the publisher of the program. Neither the colleague nor Prof. P registers the program. P uses the program, and P gives a copy to C, who gives a copy to H, etc. No one registers the program, but many are using it. Have the copyrights of the publisher been violated?*
   f. *Professor P is given a number of videotape clips drawn from a series by a textbook publisher to induce P to adopt the text. Professor P selects certain clips from the series and integrates them into a multimedia presentation for his students. He makes no attempt to publish or disseminate his multimedia presentation*

beyond his use in the classroom. Has Professor P exposed himself to any liability for copyright infringement?

III. Support for faculty to publish materials

Recommendations:

1. The MCCCD should recognize scholarly and related activities as important professional behaviors to be stimulated, encouraged, and supported.
2. The fostering, supporting, and helping to facilitate scholarship or scholarly activities might include but should not be limited to the following:
   a. Reduced teaching load
   b. Released time
   c. Summer employment and study
   d. Research which culminates in published articles, position papers, or seminar presentations
   e. Reward for more specific and meaningful articulation between faculties of the two-year institutions and the four-year colleges and universities, perhaps faculty exchange or interchange
   f. Community service
   g. Ownership rights
3. The determination of ownership rights of materials produced by faculty, whether software, print, or video materials, should be an RFP issue to be resolved by the faculty and the district rather than be an Ocotillo issue.

DISCIPLINE DIALOGUES

By: John Mildrew, SMCC
Maria Harper-Marinick, DIST

Charge:

Coordinate the professional interaction of faculty in order to facilitate a sharing of ideas, techniques, and advances related to excellence in teaching and learning.

Committee Members

Joanna Chamberlain, MCC
Bernie Combs, SCC
Rod Freeman, EMCCC
Margaret Hawks, GCC
Karen Kabrich, PVCC
Marybeth Mason, CGCC
Alicia Ottenberg, GCC
Dennis Shaw, RSCC
Joe Sueyoshi, PC

Introduction

History of Discipline Dialogues (1989-1992)

Ocotillo's 1989-1990 Teaching and Learning Group gave birth to Discipline Dialogues, a forum for Maricopa faculty to share ideas and concerns related to teaching and learning goals, challenges, and innovations of each discipline. The model was adapted from a national model to form academic alliances for and by faculty to promote professional growth and collegiality.

The main **objectives** set forth by the Teaching and Learning Group leaders included:

- To provide opportunities for intellectual and professional conversations among colleagues
- To share information, ideas, projects, and developments in the field
- To study literature and concepts which are of central importance to the disciplines
- To explore issues of local, regional, national, and international concern to the subjects taught
- To focus on the process by which students learn
- To support faculty leadership within disciplines related to excellence in teaching and learning

During 1990-1991, the structure of the Discipline Dialogues (DD) was established. The events were to be planned by Instructional Council representatives from the colleges, with support and facilitation provided by Ocotillo Discipline Dialogues leaders and Maricopa Center for Learning and Instruction (MCLI) staff. During that year, five Dialogues were conducted: Business, Communication, English, Math/Science/ Engineering, and Psychology.

Events were well attended and feedback from faculty was positive. In addition, Faculty Development Coordinators reiterated support by expressing in their strategic plan the desire to maintain the on-going dialogues.

Goals for 1991-1992

- Perpetuate the objectives defined by the Teaching and Learning Group in 1989
- Maintain the on-going dialogues
- Promote the dialogues among the different disciplines across the District
- Increase the number of participating disciplines
- Establish a Discipline Dialogues subcommittee with at least one representative from each college
- Develop a plan of action for 1992-1993

Development of Committee

During 1990-1991, the DD Chair and District support co-chair carried out the primary responsibilities of working with instructional councils, department chairpersons, or their representatives on the planning of the events and providing financial and logistics support. For 1991-1992, a DD Committee was formed to enhance these responsibilities with consideration of the following significant issues:

- reexamine the function of the Dialogues and their future
- determine potential sources of funding
- consider altering format to attract more participants
- discuss evaluation of the events.

From these discussions, the DD committee approved the following **Charge** for 1991-92:

- To discuss the future of Discipline Dialogues, promote the Dialogues at the colleges, investigate the possibility of planning financially self-supporting events, assist disciplines or interest areas in planning a Dialogue Day, and assist disciplines in articulating topics/issues to be discussed during the events.

Members of the committee are expected to attend at least three meetings per academic year during their appointment.

Year in Review

The Instructional Councils for disciplines that had a Dialogue last year were offered the opportunity to plan and implement another event this year. Most opted to continue their Dialogues. In addition, the **Reading** Council planned their first Dialogue and the **Biology** Council expressed the needs for that discipline to start planning a Dialogue separate from Math and the other sciences. For the first time, funding was provided for an event not planned by a discipline but a special-interest group, the **Electronic Forum.** The event was very successful.

Dialogue Days

The following **Dialogues** were planned for **1991-1992**:

- **Business**, chaired by Jim Rassi and the Business Instructional Council.
  Topics covered included:
  1. "The Business of Paradigms--Discovering the Future"
  2. "Transfer General Education Core Curriculum"
  3. "The New Business Environment"
  4. "Tech Prep"
  5. "Multimedia Delivery Systems"

- **Classroom Research**
  The event involved discussions of classroom research issues and ideas within disciplines and by Classroom Research technique across disciplines.

- **Electronic Forum**, chaired by Karen Schwalm.
  Presentations included:
  1. "A Beginners Group: Getting Started with Electronic Journals"
  2. "Interaction Between Electronic Journals and Classroom Instruction"
  3. "Using Subforums and other Forum Features to Enhance Learning"
  4. "Network Issues: Managing Broader Access"
  5. "The Blessings and Bane of Open Forums"
  6. "Electronic Journals Supporting Self-paced Classes"
  7. "Using Bitnet (via EF) to Improve Academic Integration"
  8. "Improving Instruction: The Research Potential of the Electronic Forum"
  9. "Innovative Uses: What We've Tried"
  10. "The Future: Plans for the Electronic Forum 2.0 (Unix)"
  11. "The Library of the Future at Phoenix College"
  12. Informal discipline-specific sessions

- **English**, chaired by Alex Joncas and Janet Klann.
  Concurrent sessions comprising the program were:
  1. "Assessment in the Community College: Looking Through a Wider Lens"
  2. "Meeting Needs of ESL Students in the Regular Classroom"
  3. "Methods for Teaching English 102"
  4. "Teaching Writing in Computer-Assisted Classrooms"
  5. "Common Final as a Tool of Assessment"
  6. "Women in Literature"
  7. "Alternative Delivery of Instruction--Open Entry/Open Exit and More!"
  8. "Aiding the ESL Student in the Regular English Class"
  9. "Teaching Reading-Based Writing in English 071"

10. "Portfolio Assessment"
11. "Collaborative Learning in the Literature Classroom"
12. "Electronic Journals and Basic Writers"
13. "The Use of Questions in Evaluating Student Writing"
14. "Collaborative Learning for English and Reading Courses"
15. "Electronic Journals Across the English Curriculum"
16. "Using Critical Thinking and Problem Solving Activities in Honors Composition Classes"
17. " ASU, NAU, UA Freshman Composition Panel Presentation"
18. "A Multimedia Presentation: ULYSSES"
19. "Preview WISC-WARE"

Plus:

- software demonstrations
- hands-on experiences with electronic journals
- book publishers' display

Math / Physical Sciences, chaired by John Mildrew.
Topics discussed:

1. "Current Trends in Math Education"
2. "District-wide Common Calculus Content"
3. "Casio 6300 Graphing Calculators"
4. "Math Manipulative Models"

And a display of testing and tutoring software, texts , and videos

Reading, chaired by Sally Rings.
Sessions included:

1. "Activated Learning: Maximum Learning, Minimum Stress"
2. "Ideas for Teaching Reading 081"
3. "Teaching Reading to Second Language Learners"
4. "Ideas for Teaching Reading 101"
5. "Developing and Teaching Reading 107"

Format

The preferred format for most of the Dialogues has been:

- one or more general sessions
- followed by small-group discussions on topics pre-selected by the event planning committee during which faculty can openly talk about ideas and concerns. The appointment of a facilitator for each of the small-group sessions is recommended.
- lunch has been provided.

The format has been relatively informal with some minimum structure. The flexibility arising from this minimal structure, according to past experience, allows for a creative and meaningful professional growth experience.

Evaluation data gathered during this year's Dialogues indicate that the best day of the week to hold a Dialogue would be Friday, some time between 12:00 noon and 5:00 p.m. Wednesday and Thursday are good alternatives. A centrally-located hotel seems to be the preferred choice for location.

Inviting commercial vendors to exhibit the latest software, hardware, print materials, and any other type of media could be beneficial in many ways. Faculty get the opportunity to see the latest technology and commercial educational products on the market; and, sometimes, these vendors will pay a fee for exhibit space that could defray in part the cost of the event.

Recommendations

Recommended Plan of Action and Timeline for 1992-1993

- Disciplines to consider--The following disciplines have either started their planning for Dialogues to be held in early Fall or have expressed their interest in planning a Dialogue:
  Psychology--planning for Fall, 1992
  Biology--planning for Fall, 1992
  History
  Special-Interest groups (e.g., collaborative learning, classroom research, Electronic Forum).

- The committee proposes the following **plan of action**:

1. Letters explaining the nature of Discipline Dialogues and extending the invitation to submit proposals for DD's should be sent to all Instructional Councils and special-interest groups the first week in September. A proposal form would be included with the letter. The deadline for submission should be no later than October 15.

2. Proposals submitted will be reviewed by the committee in October. The committee will allocate resources based on available funds.

3. Disciplines and special-interest groups would be informed of the committee's decision by October 31.

4. Upon request, MCLI staff would work with events planning committees on:
   - the design and distribution of invitations
   - reservations for rooms and meals
   - media needs
   - programs
   - analysis of evaluation data.

5. All Dialogues should be held between November and early April.

Further Recommendations for 1992-1993

- Maintain Disciplines Dialogues as an avenue for Maricopa faculty to come together and share information, ideas, projects, and developments in their fields.
- Perpetuate the objectives defined by the Teaching and Learning Group in 1989-1990.
- Promote the Dialogues among the different disciplines across the District to increase the number of participating disciplines and special-interest groups.
- Maintain a Discipline Dialogues committee with at least one representative from each college.
- Plan the establishment of an electronic forum for each discipline and special-interest group for the exchange of information on the latest instructional technology and materials, as well as new and innovative ways to promote excellence in teaching and learning.

Conclusion

Faculty from different disciplines across the District and with special interests need opportunities to explore teaching and learning issues of the 90's. Undoubtedly, the Discipline Dialogues have served as a means for Maricopa faculty to come together, exchange ideas, and learn from each other as they look at new ways to meet the educational needs of our communities. The DD model promotes a collegial community that enables ideas to evolve and to be disseminated.

It is the recommendation of the committee that the Dialogues be continued during the 1992-1993 academic year. The following issues remain open for discussion and should be addressed by the committee next year:

- Should the DD agendas be limited to technology-related topics?
- If special-interest groups are supported to plan Dialogues, should a new, more comprehensive, name (i.e., Faculty Forums) be considered?
- How should funds be allocated:
  1. In proportion to the number of participating faculty?

2. Only to those disciplines/groups planning a Dialogue for the first time?
3. Other criteria?

- Should the Dialogues become financially self-supporting events? How can this be accomplished?

- How should committee members be selected and how long should they serve on the committee?

Instructional Computer Conferencing

By: Karen Schwalm, GCC
Shirley Lowman, DIST

Charge:

Support and promote the Electronic Forum as well as other new information resources for the exchange of ideas and information in support of instruction.

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Committee Members

Al Battle, PC
Jerry Baxter, PVCC
Conrad Bayley, EMCCC
Julie Bertch, RSCC
David Bonnici, MCC
Phil Cram, PVCC
Pam Davenport, CGCC
Bill DeHaan, MCC
Jim DeVere, GWC
Richard Felnagle, MCC
Betsy Frank, RSCC
Billie Hughes, PC
Jim Hughes, PC
KC Hundere, GCC
Ed Kelty, RSCC
Lee Kirkpatrick, GCC
Jerry Latham, SCC
Manuel Lopez, SMCC
Roxana Maskell, GWCC
Paul Maxson, GCC
Jim McDonald, RSCC
Loretta Mondragon, PVCC
Nancy Musser, GWC
Chas Moore, MCC
Victor Navarro, CGCC
Liz O'Brien, PC
Geri Rasmussen, GWCC
Bobby Sample, DIST
Gene Schmidt, SCC
Jack Sexton, PVCC
Pinny Sheoran, GWC
Eileen Shiff, GCC
Don Snow, SCC
Bill Snyder, DIST
Frank Torres, GCC
Jim Walters, PC
David Weaver, CGCC
Sandra Wells, SCC
Janet Whitaker, DIST
Lynn Ann Wojciechowicz, SMCC
Roger Yohe, EMCCC
Chris Zagar, DIST

Introduction

The primary means of instructional computer conferencing within the District has been the Electronic Forum (EF). Hence, the Instructional Computer Conferencing committee has concentrated on EF this year, while continuing to explore a variety of new information resources (including Bitnet/Internet). Ultimately, our goal is a seamless instructional conferencing system that encourages student-with-student, student-with-instructor, and student-with-materials interactions.

We discovered, this year, that the Electronic Forum Steering Committee (consisting of faculty members using the EF at each campus and network services people from each college) and people interested more generally in instructional computer conferencing were the same. So rather than meet separately, we decided to meet together. The committee has met five times (including the Dialogue Day) so far this year. We have a meeting scheduled using the Video Conference Network for April, and another meeting scheduled at the end of the semester. The meetings have been very well attended, lively, and productive.

Year In Review

Look How We've Grown!

Fall semester began with the full implementation of EF at all MCCCD campuses. For the first time, all faculty members district-wide (full-time and part-time) could use electronic conferencing to supplement conventional instruction. During spring semester:

- 15,700 people had current EF access district-wide.
- 320 separate forums had been created.
- 205 class journals were operating in almost all the disciplines.

This year, a number of new kinds of forums appeared:

- Transfer Forums (helping with transfer to ASU)
- On-line Tutoring and Hotlines
- Bitnet List links
- Foreign Language Forums
- Focused Topic Forums (Crisis in the Workforce)
- Database Forums (WantAds and BookTrader)
- Campus Newspaper Forum (A new kind of letters to the editor!)

The following new features were added to the Electronic Forum:

- Multiple Mail and Read Receipts
- Enhanced Recordkeeping and Links to SPSS
- Synchronous Converse Capabilities
- Subforums
- Student Moderators

Networking the State

In March, ASU installed the Electronic Forum on its VAX, and approximately 125 students in three or four classes have begun using it. This trial group includes undergraduates, tutors, and graduate students as well as faculty members teaching in the composition program. A former GCC student currently at ASU is moderating the "help" forum within EF, and a part-time instructor who uses EF at PC is part of the initial group of faculty using the forum at ASU.

Phoenix College pioneered the first Transfer Forum, and others have opened at other colleges. These forums help students and faculty get answers to their questions about transferring to ASU; advisors in the transfer office at ASU read in these forums daily and answers questions.

In April, Pima Community College received a copy of the Electronic Forum. They intend to install it on their VAX and experiment with it during the summer.

A number of people district-wide are also exploring links with local high schools.

Sharing With Colleagues: EF Dialogue Day

Seventy (70) people from the district attended a Dialogue Day held at Phoenix College. Seventeen sessions (three of them repeated) were held on a variety of topics relating to the use of the Electronic Forum:

- Getting Started with Electronic Journals
- Interaction between Electronic Journals and Classroom Instruction
- Using Subforums and other Forum Features to Enhance Learning
- Network Issues: Managing Broader Access
- The Blessings and Bane of Open Forums
- Electronic Journals Supporting Self-Paced Classes
- Using Bitnet (via EF) to Improve Academic Integration
- Improving Instruction: The Research Potential of EF
- Innovative Uses: What We've Tried
- Informal Discipline-specific Sessions (4)
- The Future: Plans for EF 2.0

Telling Others What We Are Doing!

Faculty using the Electronic Forum have reported their results at several local, regional and national conferences:

- Arizona English Teachers Conference--English Dialogue Day
- National Chairs Conference
- District Conference on At-Risk Students
- American Association of Community and Junior Colleges
- Western States Communication Association
- Conference on College Composition and Communication
- Computers and Writing Conference
- Western States Conference for Teaching English in the Two-year College
- Harper-Collins Mathematics Workshop

The Complete Guide to the Electronic Forum: Coming Soon

This spring, the ICC saw the first draft of a complete user's guide to the Electronic Forum. A member of ITS is responsible for layout and design. Ultimately, the manual will have four sections directed at general users, student moderators, forum administrators, and system managers.

Reaching Out to Part-time Faculty

A number of colleges use the Electronic Forum to build communication with part-time faculty. Some colleges have established specific forums for part-time faculty; others have established discipline-specific discussions open to all faculty. EF does not require a VAX account, so it is easy to add new users.

New Varieties of Instructional Delivery

A number of instructors are using the Electronic Forum in unconventional instructional formats. Self-paced English classes at MCC and GCC use computer conferencing to enable students (who don't ever physically meet) to discuss what they are writing, to get critiques, or to meet with the instructor.

RIO has replaced CoSy with the Electronic Forum. This year, English and Anthropology classes used EF extensively.

Conferencing around the World

One way to introduce students to the wider world of network communication is by pulling Bitnet lists into the Electronic Forum where students can read the entries. We have been experimenting with this for two semesters now: one faculty member at PC has pulled in KidsNet for her education class, and at GCC, another faculty member has pulled in FOLKLORE and LORE for use with her English 102 classes. Another faculty member in anthropology is planning to link her class with a class in Alaska so that students can discuss issues raised by the course content.

MCC has developed the concept of the Global Classroom, linking students in foreign language classes with native speakers in other countries. MCC students use VaxMail and write in the foreign language; the students with whom they communicate respond in English. In business classes, students use the Global Classroom to communicate with students in Europe about economic issues, the new European Economic Community, jobs, and prices of common items.

Where Do We Go From Here?

Announcing the New, Improved EF 2.0!

A new version of EF, designed under the UNIX operating system, is due for testing at GCC for the first summer session; it should be available for district-wide use for fall semester. While we will continue to support EF 1.0, most development efforts will now be devoted to this new version. In version 2.0, EF will be completely redesigned internally to accommodate higher usage; because it will be totally client-server based, we will be able to develop graphical user interfaces. EF 2.0 will provide

- a new simple editor with full-screen capability.
- revised help materials.

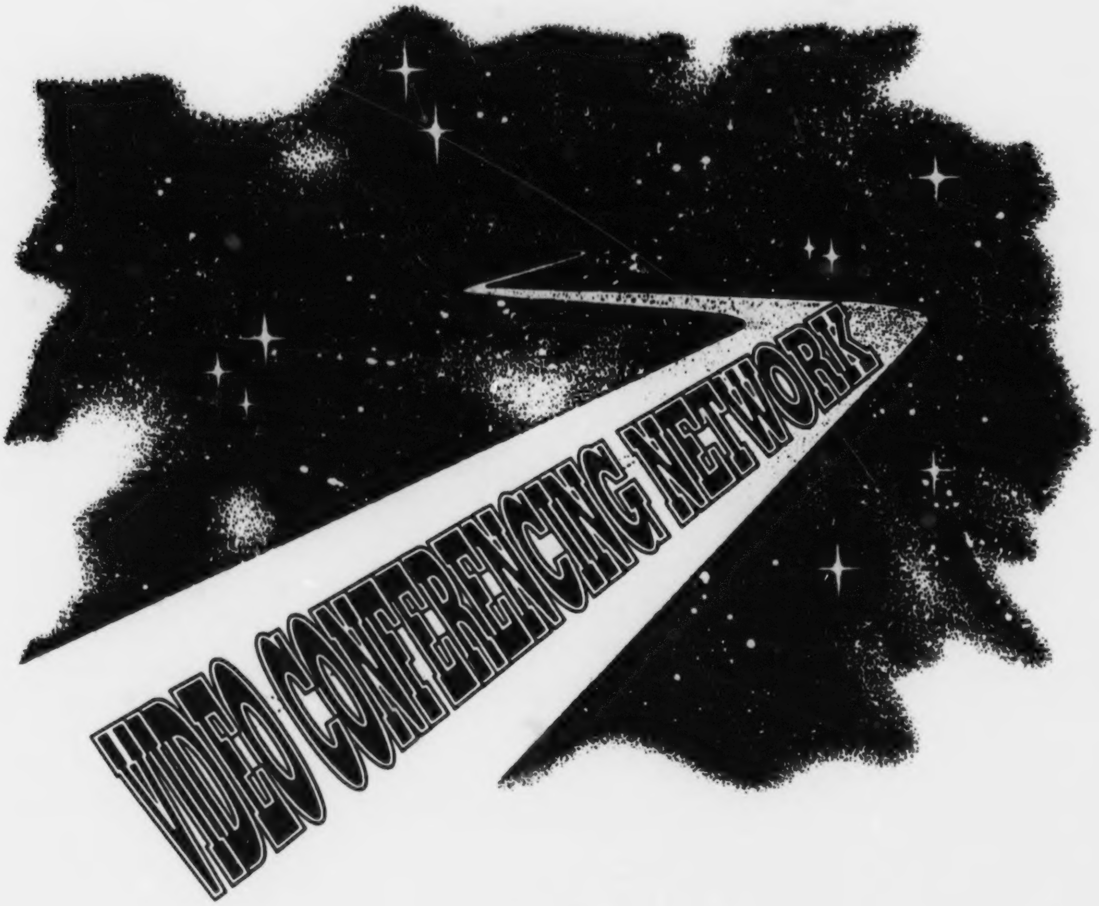
- transparent connections across locations.
- efficient links to Internet (and via Internet to Bitnet).
- infrastructure for future use of sound and graphics.
- better recordkeeping for classroom use and instructional research.
- improved transport functions for spreadsheets, hypercard stacks, and formatted documents.

Challenges Ahead

We anticipate that the new version of EF will solve many of the problems caused by high volume usage. It will undoubtedly present us with new challenges, among them

- developing students' awareness of responsible computing.
- balancing different kinds of computer uses, including those closely tied to instruction and those more loosely connected with intellectual growth and personal development.
- encouraging as well as guiding use of outside networks.
- exploring the use of computer conferencing in conjunction with innovative instructional formats like the Video Conference Network, self-paced, and open-entry/open-exit classes.
- inventing effective strategies for using computer conferencing to supplement and improve conventional classroom instruction.
- resolving conflicts between revenue issues and instructional innovation.
- designing ways to use computer conferencing to enhance and measure institutional effectiveness.
- increasing connectivity among locations without impinging on local autonomy.
- measuring the effect of computer conferencing on student retention and learning.
- rewarding faculty who guide "open" discussions.
- creating effective graphical user interfaces with easily usable tools to help improve communication.

We anticipate exciting developments with instructional computer conferencing in the years ahead.



VIDEO CONFERENCING NETWORK

By: Norman Jenson, SCC
Janet Whitaker, DIST
Jamie Cavalier, DIST

Charge:

Focus on issues relating to the district's interactive, multi-site, multi-media communication infrastructure and promote the existing video conference system.

Committee Members

Larry Bunting, SCC
Mark Butler, RSCC
Rene Diaz-Lefebvre, GCC
Eric Loring, SCC
Willie Minor, PC
Chas Moore, MCC
Irwin Noyes, SCC

Joan Owens, MCC
Steve Platte, PVCC
Jill Seymour, GCC
Jean Staten, GCC
Bob Sullivan, PC
David Weaver, CGCC
Kimb Williamson, SCC

Introduction

Background

Ocotillo's 1991-1992 Video Conference Network committee successfully began a dialogue between eleven faculty members representing seven colleges and four representatives from the district office in three meetings which were held in the fall of 1991-1992. It was determined that this committee would meet alternately in district conference rooms and on the Video Conference Network (VCN).

Charge

- To analyze and promote the VCN allowing colleges to determine their own specific directions.
- To explore the philosophical issues.
- To promote effective teaching and learning through the use of the VCN.

It was determined that this first year of committee work would focus on fact finding.

- What is the system and how does it work?
- What are faculty and students reactions after having used the system?
- How can we make this technology a useful tool to enhance the teaching and learning process?
- How do we get colleges to buy into the system?
- What training is necessary for faculty and students to use the system comfortably?
- What can best be offered on the VCN?

Year in Review

What is Video Conferencing?

The Video Conference Network (VCN) of the Maricopa Community Colleges is an interactive, multi-site, multi-media communications system that "links" seven district locations:

- Chandler/Gilbert Community College
- District Support Services Center
- Glendale Community College
- Mesa Community College
- Phoenix College
- Rio Salado Community College
- Scottsdale Community College

This system allows for idea exchange, discussion, demonstration, and presentation similar to an in-person classroom experence.

Why Video Conferencing?

- Participation by more people in classes and meetings
- Reduced travel between colleges
- "Sight and Sound" from all locations
- Better time management
- Professional development in the newest technologies
- Enhancement to teaching strategies
- Demonstration of dedication to teaching excellence through innovation

The VCN Provides

- Motion/full-color video and sound from all locations
- Availability of a close-up camera on the table to show written work and real objects from all locations
- Microphones, cameras and T.V. monitors for all participants to be heard and seen by all participants at all locations

Potential Uses

- Team teaching
- Shared classes and programs
- Guest lectures
- Instructional council meetings
- Task force meetings
- Special project meetings
- Grant development meetings
- Leadership development meetings
- Lodestar programs
- Seminars and workshops for students and staff

Who can use it

- Any staff or faculty member of MCCCD

Faculty/Student Reactions

- The three faculty members who have used the system had favorable comments on the effectiveness of the VCN. Lectures, demonstrations, open class discussions, cassette tapes, video tapes and slide reproductions all can work effectively on the VCN. All judged that the VCN is a technology that can promote and enhance teaching and learning.
- Small enrollments at remote sites required a class facilitator. Large enrollments at remote sites required an additional instructor (team teaching).
- Comments from students were basically positive. Students felt they were part of each class regardless of the "electronic" distance involved.
- Interaction between students and instructors was positive and effective.
- Fax machines and inter-campus mail were used to collect and distribute materials between various sites on the VCN.
- Committee members not having taught on the system expressed enthusiasum in becoming involved in teaching on the system.
- Presently, the Maricopa Center for Learning and Instruction (MCLI) provides instructor training for faculty on a "one to one" basis.
- Class scheduling is handled by the VCN Coordinating Committee comprised of Deans of Instruction from the various "user" colleges with district coordination.

Conclusion/Recommendations

Committee Recommendations

- Standardized equipment needs to be provided by District to all sites so that these sites can each send and receive "state of the art" materials--i.e. cassette tapes, compact discs, video tapes, slides and computer graphics, programs, etc.
- Enrollments at remote sites should determine whether a facilitator or additional faculty support is necessary.
- To enhance student-teacher interaction effectively, cordless microphones and a "roving" camera need to be provided so instructors are not "nailed" to an eight-foot projection area.

- Both sight and sound transmissions need to be improved so technology does not get in the way of the teaching and learning process.

- Instructors need to be "in control" of all technical operations during class time so the spontaneity of the class presentation can be maintained.

- The switching time between various sites on the network needs to be improved so time is not lost while waiting for technology to complete its task.

- High quality fax machines need to be available in each sending and receiving site for immediate sharing of materials.

- A telephone needs to be available in each VCN classroom for back-up emergency communication with site media centers.

- Classroom facility design is of paramount importance so appropriate lighting and acoustics are provided and "back-row" students are not lost on the T.V. monitors. "Eye contact" is most important.

- Extra time needs to be provided when scheduling classes and teacher assignments for student-teacher conferencing both before and after the regular class session.

- Copyright concerns on broadcast materials need to be explored by the district legal department.

Chairman recommendations

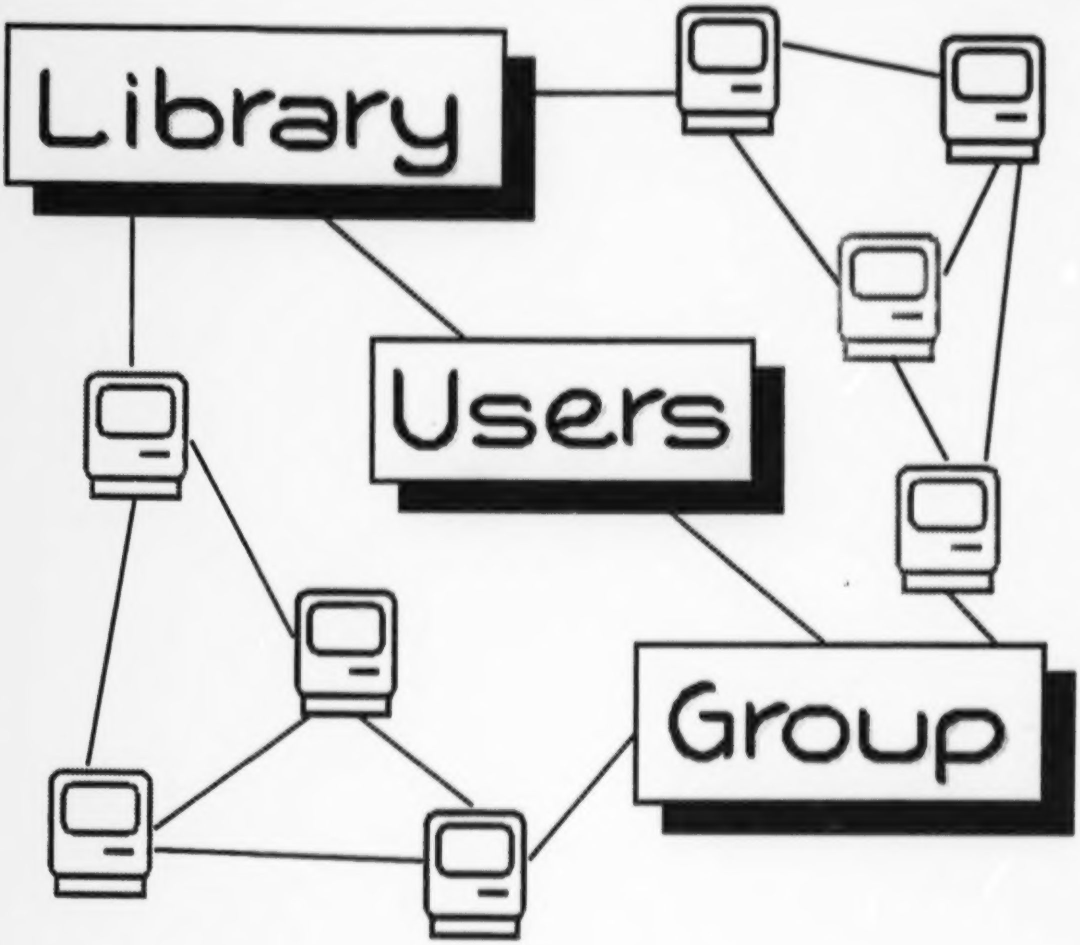
- Experienced faculty involvement needs to be included at all levels of planning and training. Faculty who have used the system and have the enthusiasum for the technology can help formulate, co-ordinate, and promote the VCN as an effective technological tool for the enhancement of the teaching and learning process in the MCCCD.

- It is most important that close coordination continue to exist between Information Technologies Services (ITS) and MCLI so appropriate training stratagies can be developed prior to the introduction of new equipment into the VCN

- Adequate training time on the system needs to be provided to faculty prior to the beginning of classes.

- Attention needs to be directed toward development of training materials for students who use this system.

- Faculty training for designated and interested faculty needs to be provided on a continuing semester by semester basis. Training needs to be continually reviewed, upgraded, and updated based on faculty experience on the VCN and new and developing technologies.
- Procedures need to be publicized concerning the scheduling and promotion of classes offered on the VCN
- Attention needs to be directed to faculty class loading/extra pay for those faculty who teach on this system.
- This committee should continue to function on a yearly basis. It has the potential to research, advise, recommend and evaluate the VCN as an effective technological tool to enhance teaching and learning in the MCCCD.



By: Debbie Anderson, SMCC
Bob Davidson, DIST

Charge:

Evaluate and select research databases, address the role of the library on campus, and develop new vision for the future of information use and management.

Committee Members

Gwen Argersinger, MCC	Kathy Schwarz, SCC
Georgia Dillard, PC	Russ Sears, GCC
Linda Evans, MCC	Winifred Shea, PC
Lou Farmakis, PVCC	Sara Soller, PC
Pat Lokey, SCC	Philip Tompkins, EMCCC

Introduction

Ocotillo Library Users Group Revised Mission Statement

The Library Users Group of Ocotillo:

- encourages collaborative educational experiences that empower students for lifelong learning and enhance their information literacy
- develops programs and guides that promote fuller understanding among MCCCD
- opens new avenues of communication among librarians and other teaching faculty to create effective and integrated learning environments

Year In Review

The Ocotillo Library User's Group has taken accomplishments from the past and moved ahead towards encouraging greater cooperation among teaching faculty, librarians, and Library Technical Services (LTS). We have taken the ON-LINE and CD-ROM List that was produced last year and up-dated the list of new technology that has been added to the different libraries throughout the District. There have been a number of new databases added, especially at Mesa Community College and its Information Commons. The committee noted the disparity in the number of databases among the different campuses and the information technology they are able to offer their students.

Major Accomplishments

- Mission Statement: This year the committee felt the need to rework its mission statement and include such concepts as information literacy, integrated learning environments, and collaborative educational experiences.

- On-Line and CD-ROM Databases List: Last year the committee put together a comprehensive list of all CD-ROM and ON-LINE DATABASES used throughout the District. This year the committee up-dated this list to include the ever growing number of new databases used in the libraries. This new list has been loaded on the On-Line Public Access Catalog (OPAC) and is now available on-line to all students, staff, and faculty. This service enables everyone to have access to the description and location of all the electronic databases in the District.

- Collaboration among the Library Automation Users Group (LAUG), LTS, and Ocotillo: In conjunction with the updated Database List project, the three District groups, LAUG, LTS, and the Ocotillo Library Users Group worked closely together to see this project come to a successful conclusion. Ocotillo originated the project, LAUG members up-dated the list and gave input during the process, and LTS agreed to maintain the list once it was completed. This joint project brought all three groups closer together to achieve the common goal of bringing information to students, faculty, and staff.

- Exploration of the Need for Full Text and Full Image Periodical Databases: One of the committee's overwhelming concerns was the need for full text periodicals on-line. Students and instructors have become increasingly sophisticated in their use of electronic information and have come to expect their information to be delivered immediately. The technology has become available in the past year to make this possible and we would like to see the District make a decisive move towards the next phase of automated information delivery. There is a movement within the District to work with other valley libraries such as Maricopa County Library, ASU, Phoenix Public Library, and Scottsdale Public Library to purchase these databases as a consortium in order to reduce the costs and increase the access to more indexes and full text journals.

Committee Recommendations

Ocotillo Library Users Group is making the following recommendations after having reviewed the new technology and considered the pressing issues concerning student and faculty informational needs and available technology on the campuses:

- System Enhancement for Magazine Index: The libraries completed a new format in their on-line magazine index this past year. This enabled the students to learn a single search strategy for magazines as well as books. In addition, with this new format, the District is able to purchase software which would enable the library OPAC to display the campus locations along with the magazine title. In practical terms this means that the student would not only be able to find the citation of a particular article but he would also be able to know which campus has the magazine. This service should greatly assist students and teachers in their ability to access information. In addition, this feature would enable the District to use the existing system to its fullest potential.

- Future Acquisition of Full Text/Full Image Journal Database: This year has marked a major advancement in the ability to have full text delivery of journal articles. There are two companies with available databases that would enable users to view and reproduce entire articles from the OPAC. This Ocotillo committee strongly recommends that the District pursue the purchase of these databases and necessary disk drives to move forward into the next phase of information delivery.

Future Concerns

- Training of Faculty and Staff: One of the future concerns of this committee is to develop some mechanism for training of staff and faculty. The system is constantly changing and there are always new employees who want to learn how to use the library system. Next year we hope to develop a way to reach these people and familiarize them with the library automated system.

- Equity among Campuses in Access to Databases: One of the biggest concerns of the teaching faculty on this committee was the great disparity among the campuses concerning the databases available to students and faculty. This problem needs to be addressed next and some solutions sought. All MCCCD students and faculty should receive the best access to information.

Addendum

The following updated list of MCCCD databases has been placed on the OPAC to make it more readily available to all staff, students and faculty. It is the kind of document that requires constant updating and therefore is well suited to the electronic medium. The responsibility for the updating of this document will be assumed by LTS.

MARICOPA COMMUNITY COLLEGES
ON-LINE AND CD-ROM DATABASES BY TITLE

1990 *Time* Magazine Compact Almanac

- CD-ROM – chronicles from *TIME* magazine
- almanac of facts
    - College location: MC

Bible Library

- CD-ROM—29 titles on the Bible
- concordance
    - College location: MC

Books in Print

- CD-ROM of books currently published or distributed in the United States
    - College location: MC, MCLI, SM

Business Newsbank

- CD-ROM index to newspaper articles in the field of business
- full text available on microfiche
    - College location: MC, PV

Compton's Multimedia Encyclopedia

- CD-ROM
- 32,000 articles
- 15,000 images
- maps and graphs
- Merriam-Webster Intermediate Dictionary
- 60 minutes of sound, music and speech
- 45 animated sequences
    - College location: PC

Computer Select

- CD-ROM—full-text articles in the field of computers
- updated monthly
    - College location: MC

Datatimes

- On-line database with 650 sources of information full text
- 60 regional newspapers

- *Arizona Daily Star, Phoenix Gazette, Arizona Republic, Arizona Business Gazette, Tucson Citizen and Arizona Republic*
    - College location: CG, GC, GW, MC, MCLI

DIALOG

- On-line information service
- 350 databases
- 200 million records of citations and abstracts
- 24-hour-a-day access
- user fee
    - College location: CG, GC, GW, MC, PC, MCLI, SC, SM

ERIC

- CD-ROM database—citations of education resources
- over 750 education-related serial and research reports
- facts on file
    - College location: GC, PV, SM, MCLI

Facts on File

- CD-ROM
- 1980 to current
- a weekly world news digest
    - College location: GC

Grolier's Academic American Encyclopedia

- CD-ROM
- 30,000 articles
- graphs, photographs and maps
    - College location: CG

Illustrated Encyclopedia

- CD-ROM encyclopedia
- graphs, photographs and maps
- INFO-TRAC
    - College location: MC

Infotrac

- CD-ROM
- index to magazine articles
    - College location: GC

Languages of the World

- CD-ROM
- includes Chinese, Danish, Dutch, English, Finnish, French, German, Italian, Japanese, Norwegian, Spanish and Swedish
  - College location: MC

Library of the Future

- CD-ROM complete text of 300 works of Literature, Philosophy, Drama, Poetry, Science and Religion
  - College location: MC

Magazine Index (IAC)

- available on the OPAC (on-line public access catalog)—D2
- indexes over 400 magazines
- current five years
- some abstracts
  - All College Locations

Magazine Rack

- CD-ROM database of twelve months of full text articles on current topics
  - College location: MC

Medline

- CD-ROM database compiled by the National Library of Medicine
- 300,000 citations from 3,400 medical journals added yearly
  - College location: GW

Microsoft Stat Pack and Small Business Consultant

- CD-ROM with vital statistics and government publications on business, economy, politics and demographics.
  - College location: MC

National Newspaper Index

- CD-ROM
- includes: *New York Times, Wall Street Journal, Christian Science Monitor, Washington Post, Los Angeles Times.*
  - College location: GC, MC

Newsbank

- CD-ROM index to over 400 regional newspapers

- full-text articles on microfiche
- 450 cities and 100 periodicals
- available at select campuses: Newsbank, Business Newsbank, Names in the News and Newsbank Review of the Arts.
    - College location: GC, MC, PV, SC, SM

Newspaper Abstracts on Disc

- CD-ROM index and abstract to national and regional newspapers
- includes: *New York Times, Atlanta Constitution, Boston Globe, Christian Science Monitor, Los Angeles Times, Wall Street Journal and Washington Post*
    - College location: GC, MC

OPAC

- On-line public access catalog lists books and materials located at every campus
- includes magazine index (IAC) indexing over 400 magazines since 1987 and updated monthly
    - All College Locations

Periodical Abstract on Disc

- indexes 300 basic reference periodicals
- abstracts
- located on LAN (local area network)
    - College location: MC

Readers' Guide Abstract

- CD-ROM index to general periodicals with abstracts
- located on LAN (local area network)
    - College location: MC

SIRS

- CD-ROM full text of newspaper and magazine articles on major topics
- located on LAN (local area network)
    - College location: MC, GC, PC

VU/Text

- on-line full text access to newspaper articles
- includes *Arizona Republic*
    - College location: MC

Wilsonline

- On-line access to 26 specialized subject indexes
- indexing begun in 1982
  - College location: MC, SC, SM

Wilsondisc

- CD-ROM index to Readers guide abstract
- over 400 magazines indexed
  - College location: MC, SC, SM

COLLEGE LOCATIONS OF ONLINE DATABASES AND CD-ROMS

CHANDLER-GILBERT COMMUNITY COLLEGE	**DIALOG:** On-line, bibliographic citations. **GROLIER'S ACADEMIC ENCYCLOPEDIA:** CD-ROM updated annually, full-text (located in the Mac Lab).
GATEWAY COMMUNITY COLLEGE	**DIALOG:** On-line, bibliographic citations. **MEDLINE:** CD-ROM since 1988. **OPAC:** On-line public access catalog with magazine index and connection to ASU catalog.
GLENDALE COMMUNITY COLLEGE	**DATATIME:** On-line, full-text newspaper articles. **DIALOG:** On-line, bibliographic citations. **ERIC:** CD-ROM, citations, updated monthly. **FACTS ON FILE:** CD-ROM, news information. **INFO-TRAC:** CD-ROM, index to magazines. **NEWSBANK:** CD-ROM, citations, full text on microfiche. **SIRS:** CD-ROM, full-text articles.
MARICOPA CENTER FOR LEARNING & INSTRUCTION (DISTRICT)	**ERIC:** CD-ROM, abstracts. **OPAC:** On-line public access catalog with magazine index and connection to ASU.
MESA COMMUNITY COLLEGE	**BOOKS IN PRINT:** CD-ROM, current books in print. **DATATIMES:** On-line, full-text newspaper articles. **DIALOG:** On-line, bibliographic citations. **ERIC:** CD-ROM, citations, updated monthly. **NATIONAL NEWSPAPER INDEX:** Index of five major newspapers. **NEWSPAPER ABSTRACTS:** CD-ROM abstracts of major newspapers (on LAN).

NEWSBANK: CD-ROM citations, full text on microfiche (on LAN).
OPAC: On-line public access catalog with magazine index and connection to ASU.
PERIODICAL ABSTRACT ON DISC: Index to reference periodicals and abstracts (on LAN).
SIRS: CD-ROM full-text articles (on LAN).
READERS GUIDE ABSTRACT: CD-ROM index (on LAN).
VU/TEXT: Full-text on-line newspaper articles.
WILSONLINE: On-line access to 26 indexes.
WILSONDISC: CD-ROM general periodicals index.

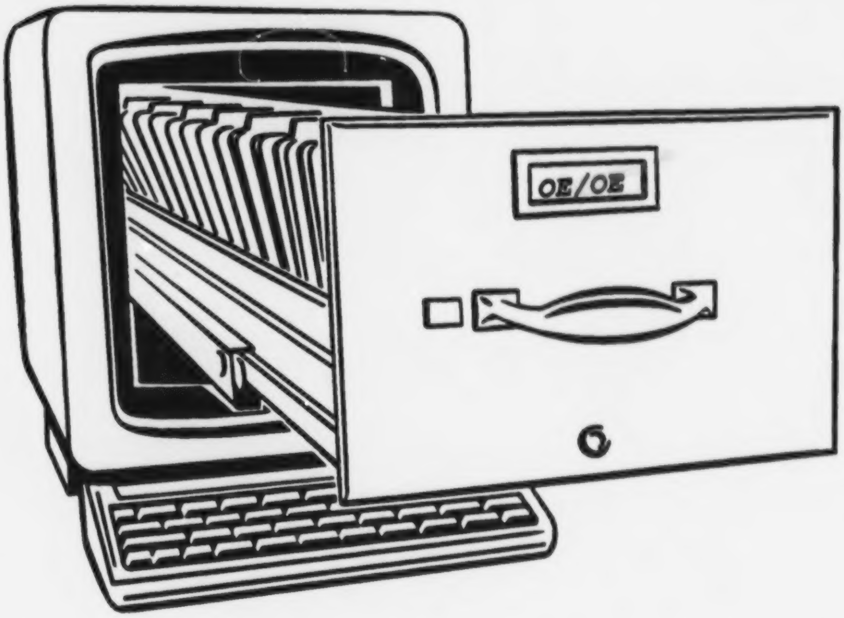
The following are located only at MESA COMMUNITY COLLEGE *on a single workstation*:

THE BIBLE LIBRARY: 29 titles plus concordance.
BUSINESS NEWSBANK: CD index to articles on business-related topics with full text available on microfiche.
COMPUTER SELECT: CD, full-text articles on the computer-related topics.
ILLUSTRATED ENCYCLOPEDIA: Similar to Grolier's Encyclopedia.
LANGUAGES OF THE WORLD: Twelve essential languages: Chinese, Danish, Dutch, English, Finnish, French, German, Italian, Japanese, Norwegian, Spanish and Swedish.
LIBRARY OF THE FUTURE: Complete text of titles from over 300 works under topics of Literature, Philosophy, Drama, Poetry, Science and Religion.
MAGAZINE RACK: CD, twelve months of full-text articles on a variety of current subjects.
MICROSOFT STAT PACK AND SMALL BUSINESS CONSULTANT: Vital statistics and government publications on business, economy, politics and demographics.
REFERENCE LIBRARY: Includes Webster's New World Dictionary, Webster's New World Thesaurus, Webster's New World Dictionary of Quotable Definitions, New York Public Library Desk Reference, Dictionary of 20th Century History, J.K. Lasser's Legal and Corporation Forms for Smaller Business, Guide to Concise Writing, National Directory of Address and Telephone Numbers.
THE 1990 TIME MAGAZINE COMPACT ALMANAC: Current events chronicle from TIME including an almanac of facts.
U.S. ATLAS: Text, statistics and road maps of U.S. regions with access through graphic interface.

	U.S. HISTORY ON CD-ROM: A hierarchy of categories on U.S. History with information from books and articles, including American People, American Places, Wars and Conflict, etc. **WORLD ATLAS:** Atlas, almanac and world fact book in one with access to over 240 fully-detailed color maps.
PARADISE VALLEY COMMUNITY COLLEGE	**ERIC:** CD-ROM, citations, updated monthly. **NEWSBANK/BUSINESS BANK:** CD-ROM, full-text citations on microfiche. **OPAC:** On-line public access catalog with magazine index and connection to ASU.
PHOENIX COMMUNITY COLLEGE	**COMPTON'S MULTIMEDIA ENCYCLOPEDIA** **DIALOG:** On-line, bibliographic citations and abstract. **OPAC:** On-line public access catalog with magazine index and connection to ASU. **SIRS:** CD-ROM Full-text articles.
RIO SALADO COMMUNITY COLLEGE	**OPAC:** On-line public access catalog with magazine index and connection to ASU.
SCOTTSDALE COMMUNITY COLLEGE	**DIALOG:** On-line bibliographic citations and abstracts. **NEWSBANK:** CD-ROM citations, full text on microfiche. **OPAC:** On-line public access catalog with magazine index and connection to ASU. **WILSONDISC:** Abstracts updated quarterly from Readers' Guide to Periodical Literature.
SOUTH MOUNTAIN COMMUNITY COLLEGE	**BOOKS IN PRINT:** CD-ROM, current books in print. **DIALOG:** On-line, bibliographic citations and abstracts. **ERIC ON CD-ROM:** Citations and abstracts. **NEWSBANK:** CD-ROM citations, full text on microfiche. **OPAC:** On-line public access catalog with magazine index and connection to ASU. **WILSONDISC:** CD-ROM, citations, updated quarterly, Readers Guide to Periodical Literature. **WILSONLINE:** On-line access to all the Wilson Indexes.

OPEN ENTRY

OPEN EXIT



By: Maria Hesse, CGCC
Virginia Cantu, DIST

Charge:

Continue to review issues of classes which do not follow a traditional timeline, emphasizing the need for a standardization of policy and procedure.

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Committee Members

Patricia Cardenas Adame, RSCC
Mary Alcon, MCC
Angela Ambrosia, PC
Doyle Burke, MCC
Kimberly Chambers, SCC
Daniel Combellick, SCC
Betsy Frank, RSCC
Lupe Gutierrez, DIST
Patti Marsh, PVCC
Suzanne Murry, GCC
Brenda Nielsen, PC
Hala Saadeldin, CGCC
John Silvester, SCC
Jill Suydam, GCC
Roger Yohe, EMCCC

Introduction

The Open-Entry/Open-Exit Committee was formed to address issues regarding courses taught in an open-entry/open-exit (OE/OE) format.

Last year, OE/OE issues began to be addressed by the Ocotillo Committee on Non-Traditional Instructional Issues. This year, it was determined that a separate group focusing primarily on OE/OE issues should be formed because:

- OE/OE courses involved self-paced learning and often made significant use of technological resources
- issues regarding OE/OE courses were not always similar to those of other forms of non-traditional instruction (e.g. distance learning, short-term classes, etc.).

Since OE/OE classes address the learning needs and time schedules of adult learners, they are in high demand and many colleges are looking to expand and/or improve their OE/OE offerings.

Our charge was to continue identifying issues which might impede the development of OE/OE courses and make recommendations regarding the resolution of those issues.

Year in Review

We were fortunate to have had a committee in the previous year that had accomplished significant work on:

- a district definition of OE/OE courses
- records management issues
- information collection and identification of issues regarding OE/OE courses

This year's group focused on:

- updating ourselves regarding last year's progress
- resolving a grading issue with the Catalog Common Pages Committee and the Directors of Admissions and Records
- identifying and publicizing the curriculum process for OE/OE courses
- identifying what courses are currently being taught in the OE/OE format around the district
- sharing methods of promoting student success in OE/OE courses
- discussing class loads and faculty loading of OE/OE courses
- evaluating those MAT and PSA positions and job descriptions which support OE/OE programs
- identifying priority topics for next year's committee.

In-Progress ("IP") Grade

It was agreed, after lengthy discussions with the catalog Common Pages Committee and the Directors of Admissions and Records, that a grade of "IP" would be given to those students who had not yet completed a particular OE/OE course at the end of a traditional grading period (usually at the end of each semester). The Common Pages Committee felt that the "I" grade should be reserved specifically for emergency situations as related to traditional structured classes. The "IP" grade would only be available for courses designated as OE/OE and would not be computed in the grade point average.

Curriculum Process

There was confusion among committee members and other individuals at their colleges as to the process involved in offering a course in the OE/OE format. Virginia Cantu of the Educational Development Office reviewed the process in place for a course to be designated OE/OE in the course bank. This process was adopted by the district Curriculum Committee on October 24, 1988.

- The college wanting to offer the course in an OE/OE format should ensure that the course competencies are on file at the district Curriculum Office.
- If the district Curriculum Office does not have a set of competencies on file, the college will be responsible for developing those competencies.
- The college will forward the competencies to the appropriate instructional council(s) and allow 30 days for instructional council(s) to respond.
- Once approved by the instructional council, the competencies will become the official MCCCD course competencies and will remain on file at the district office.

- The course competencies will be placed on the district Curriculum Committee agenda as an "information item" for their next meeting.
- Once approved by the Curriculum Committee, the competencies will be distributed to Occupational Deans, Deans of Instruction, college curriculum staff, etc.

Because many courses have approved competencies on file, they may be offered in the OE/OE format without a special process of approvals. Colleges should contact Virginia Cantu to confirm whether or not competencies have been approved for a particular course, and to confirm whether or not a course has been designated as being available in the OE/OE format in the course bank.

Expansion of OE/OE Course Offerings

A representative from each college was asked to compile a list of those courses that are currently offered in the OE/OE format. The following list is a summary of the findings, which may not be entirely complete. Also, some individuals reported course numbers in use during the spring semester, while others reported the new course numbers being used for the fall semester. So the list may include some overlap (for example, BPC108AB was offered at several colleges this spring, but beginning in the fall semester it will be numbered BPC102AB - both course numbers are listed below).

ACC115	Microcomputer Accounting
ART100	Intro to Computer Graphic Art
BPC100	Business-Personal Computers
BPC101AA	Intro to Microcomputers I (IBM)
BPC101AB	Intro to Microcomputers I (Mac)
BPC101BA	Intro to Microcomputers II (IBM)
BPC101BB	Intro to Microcomputers II (Mac)
BPC102AA	Using DOS: Level I
BPC102AB	Using Macintosh: Level I
BPC102BA	Using DOS: Level II
BPC102BB	Using Macintosh: Level II
BPC108AB	Beginning Macintosh Operations
BPC109AB	Advanced Macintosh Operations
BPC110	Microcomputer Usage and Applications
BPC/OAS111	MicroKeyboarding I
BPC112	MicroKeyboarding II
BPC114AA	Lotus 1-2-3 Spreadsheet
BPC114AE	Excel Spreadsheet
BPC114AG	Quatro Pro Level I
BPC114BA	Lotus 1-2-3 Spreadsheet: Level II
BPC117AA	Database Mgt: dBase: Level I
BPC117AD	Database Mgt: Paradox: Level I
BPC117DA	Database Mgt: dBase
BPC120AC	Microcomputer Graphics: IBM Compatible

BPC120AD	Microcomputer Graphics: Harvard Graphics
BPC121AB	MS-DOS Operating System
BPC123AA	Microsoft Windows
BPC/OAS130 AD	Persnl Micro WP: WordPerfect (IBM)
BPC/OAS130AD	Persnl Micro WP: WordPerfect (Mac)
BPC/OAS130AK	Persnl Micro WP: MS Word (Mac)
BPC130AO	Persnl Micro WP: MacWrite
BPC133AA	Lotus 1-2-3 Spreadsheet Projects
BPC135AD	WordPerfect
BPC/OAS135AK	Microsoft Word (Mac)
BPC136	Intro to Desktop Publishing
BPC138AA	MS-DOS Desktop Publishing
BPC140	Extended Microcomputer Usage
BPC217AA	Advanced Micro DB Mgt: dBase III
BPC235AD	Advanced Micro WP: WordPerfect
CHD280	Chemical Dependency Practicum
CIS104	Computer Text Editing (VAX)
CIS114AE	Excel Spreadsheet
CIS117AJ	Database Mgt: Filemaker Pro: Level 1
CIS120AB	Microcomputer Graphics
CIS162	C Programming
CRP102AI	Concrete Frmwork: Concrete Stair Forms
CRP102AJ	Concrete Frmwork: Tilt-up Construct I
CRP102AK	Concrete Frmwork: Tilt-up Construct II
CRP102AL	Concrete Frmwork: Bridge Pier Column
CPR102AR	Concrete Frmwork: Retaining Wall Fotng Frm
DFT110	Technical Drafting I
DFT111	Technical Drafting II
DFT252AA	Computer Aided Drafting I: Autocad
DFT254AA	CAD II: Autocad
ENG101	Freshman English
ENG102	Freshman English
HUM211AA	Foreign Films: Classics
OAS101	Typing I
OAS101AA	Typing I: Keyboard Mastery
OAS103AA	Typing: Skill Building I
OAS106	Clerical Machine Transcription
OAS106AA	Machine Transcription: Basic
OAS113	Micro-Alpha Indexing
OAS118	10-Key by Touch
PSY299	Intro to Psychology Lab

Student Success

One meeting was devoted to sharing those ideas which would help promote student success in OE/OE courses. Each campus was asked to share ideas that are helpful in marketing, recruitment, advisement, orientation, and retention of OE/OE students.

The session was recorded and is available on videotape. Individuals who wish to obtain a copy of "Promoting Student Success in OE/OE Courses" may send a blank video to the Center for Learning and Instruction, c/o Donna Kardell.

Highlights of the session included:

- a review of the on-line orientation programs that have been developed at Phoenix and Scottsdale
- the course organization techniques that are being used at Glendale
- information about the retention features of the INFORM system which is in place at Mesa, Glendale and other campuses
- the advisement materials and course materials that have been developed at Chandler-Gilbert

Class Size/Faculty Loading

One meeting was devoted to discussing the emerging roles in OE/OE programs, faculty loading for OE/OE classes, and related issues. The committee agreed that it was necessary to convey the message to Deans, Division Chairs and others involved in making decisions for OE/OE classes, that the faculty teaching OE/OE courses don't work any less than their structured class counterparts. They just work differently. Therefore, it was fair to load an OE/OE course with approximately the same number of students as a similar structured course might have. If a structured class with *xx* students generates *y* faculty load, then a similar OE/OE course with *xx* students should generate *y* faculty load (assuming equal credit hours). On the other hand, if a college is in the process of building a new program, some courses may be allowed to "make" with fewer than the normal number of students, to get the program off the ground. This same philosophy might need to be followed at colleges which are trying to get OE/OE courses started.

In other words, the decision-making process for determining student loading for an OE/OE class and/or faculty loading should parallel the decision-making process on that campus for working with traditional structured courses.

Roles/Responsibilities

A number of campuses have support staff helping OE/OE programs, but titles and classifications for such positions vary. Each campus was asked to send a list of those individuals (MAT and PSA) who are primarily involved in supporting OE/OE programs.

The April meeting will focus specifically on issues of roles and responsibilities, with questions such as:

- Are there job descriptions that adequately describe what we expect support staff to do?
- In what ways are these support positions distinguished from faculty positions?

We will discuss whether or not to recommend that the district job bank be reevaluated to make certain that job descriptions are accurate, that classifications are appropriate, and that new and emerging roles have been included.

Conclusion, Future Goals

During the year, we came to some common agreements, updated information about current practices/offerings in the district, shared ideas about teaching and learning and student success, and learned some new things about district operations.

There are a number of issues that the committee identified as important that have not yet been addressed. We would like to focus on the following issues in the coming year:

Lab Fees

The charges for computer lab facilities vary significantly from campus to campus.

- At some campuses, a flat fee is attached to courses that use computer facilities.
- At other campuses, a fee is attached to a specific course, but the fee varies based upon the number of credit hours the course involves.

There are other variations as well. This is of concern to the OE/OE Committee because often OE/OE programs are interconnected with campus computer labs.

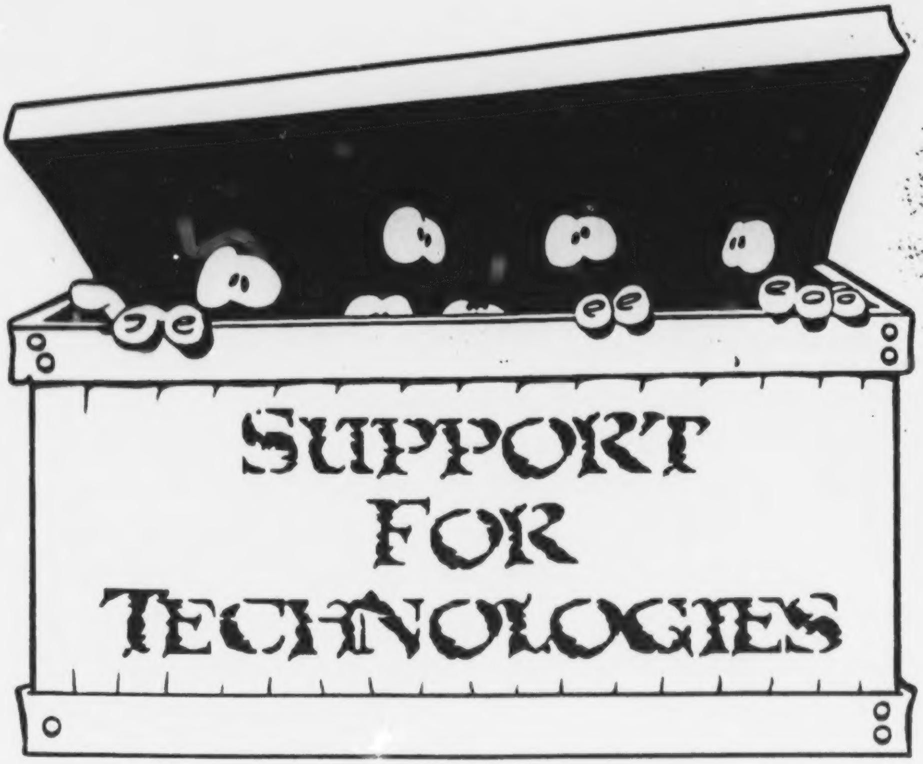
Records Management

Our current SIS structure is based upon a semester system. Although we find ways to work around the system to deal with non-traditional classes, perhaps we need to investigate systems and methods that would better serve non-traditional classes, since the enrollment in such classes is growing.

Infrastructure

We need to examine whether the district's current budgeting and resource allocation systems adequately encourage the expansion of OE/OE programs for non-traditional students. We are not certain what the facts are. So, a first step would be to gather accurate data about the current process. Some possible questions might be:

- Are college operational budgets based on basic day FTSE?
- Is facilities planning and allocation based upon basic day FTSE?
- If so, what incentives exist to encourage administrators to pour resources into courses for OE/OE students since they do not generate basic day FTSE?
- Related to this is the issue of RFP staffing guidelines which are based on basic day FTSE.



SUPPORT FOR TECHNOLOGIES

By: Patricia Harris, MCC
Debbie Krumtinger, DIST

Charge:

Provide a foundation for technological advocacy and focus on an analysis of district-wide use of technology to develop a resource database for implementation and support.

Committee Members

Al Battle, PC	Paul Maxson, GCC
Jerome Baxter, PVCC	Irwin Noyes, SCC
David Bonnici, MCC	Donna Ransom, SMCC
Joyce Elsner, GCC	Charles Sessions, SCC
Marian Gibney, PC	John Schroeder, CGCC
Chrystle Hall, DIST	Emma Walters, SCC
Susan High, GCC	Chuck West, GCC
Alan Jacobs, SCC	Roger Yohe, EMCCC
Ed Kelty, RSCC	Paula Yslas, DIST
Barbara Kilpatrick, MCC	

Introduction

This report focuses on identifying some of the technologies within our District which are being used in the classroom. While not inclusive of those applications still in the developmental stage, this report serves as the beginning of a search for those implementations of teaching technologies which are actually in the hands of the students.

The Ocotillo Support for Technologies committee focused this year on two major concerns for the District:

- preparing people to use technology
- continuing to support these users

Other issues include:

- updating the committee's strategy to match technological advances
- issues of training
- technical advice/assistance on teaching technologies
- the provision for continuing support for instructional and administrative systems and users of technology

This year, Support for Technologies committee members have conducted a survey of the District's utilization of technology, including resources required for implementation and support. Key resources are identified in the Addendum as contacts for others interested in exploring various instructional techniques and media.

This Year's Progress in Review

The committee set out in search of a sampling of current uses of technology in the classroom. The intent of our study was to showcase the users of technology. The general consensus is that a heightened awareness of what is being done and how it was accomplished will facilitate the movement of more faculty into using technology in the classroom. We hope existing uses can be duplicated or will provide some direction and curricular revitalization. The development time can be minimized and the frustration lessened by collaborating with a colleague who has already done much of the groundwork or experimentation.

The committee members surveyed faculty on the current courses they are teaching using technology. Information was gathered on necessary equipment to accomplish the project, hardware/software needs, resources, support, and other issues that need to be considered. This information was compiled into a brief paragraph for each project. The projects are listed alphabetically by subject or discipline and, in most cases, identify the faculty member or department responsible for the development.

This report in no way reflects a complete picture of what is happening in MCCCD, it is intended as a sampling.

Future Goals

Technology Database

For the coming year, the members of the Support for Technologies committee would like to recommend that a database be developed of the current or past uses of technology in the classroom. We envision this as an ongoing part of Ocotillo.

A request could be made of all faculty to submit the details of what they have developed. A computerized database, available to all, could then be created identifying various search fields. All the documented uses of technology in Biology classrooms, for example, could be quickly scanned by simply entering "Biology" in the search. Or all uses of a particular software in any course could be viewed by entering the title of the software in the search. Once the search is completed and the information available is gathered, the responsible faculty member may be contacted for further details or answers. The information could also be made available either in print form or on-line as a directory. Such a directory would need to be updated and maintained as new entries are received.

We see a genuine need to be able to easily share this information among all of MCCCD. The process will also provide an excellent means for measuring how far Ocotillo has come. This may be the next charge for the Support for Technologies committee, or it might warrant the creation of a new committee.

Addendum

Instructional Uses of Technology at MCCCD

Accounting Lotus 1-2-3 Faculty PVC

The accounting faculty use Lotus 1-2-3 templates on the IBM PC in accounting classes.

Admin/Justice FATS Faculty GCC

The Administration of Justice Department uses FATS (Firearm Training System). This is a teaching supplement that gives potential police officers actual hands-on experience training in real life-threatening situations. The system uses a computer interfaced with a video projector and a laser gun that shoots blanks. The FATS has been implemented in the classroom for two full semesters and according to the instructor, has been extremely successful. This is current state of the art equipment and is used in police forces across the country. The training for this takes about four hours to become fully familiar with it.

Art MAC/IBM Ted Wolter CGC

A lot of computer technology is being used in the teaching of Art 100, 169, 173, 289, and 290. Both MAC and IBM compatible platforms are used primarily with Draw, Paint, and desktop publishing software. Limited access is also provided to 3-D, animation, and photo retouching software. Peripherals include laser printers, color ink jet printers, a scanner, and a still video digitizer. Word processing and computer graphics software are used to generate handouts and overheads for classroom use.

Biology Multimedia Mike Farabee EMCCC

I am developing a multimedia map for Bio 181/182. This map graphically displays all the software and Laserdiscs bought or planned for purchase by EMCCC which may relate to Bio 181/182. Software applications developed by EMCCC faculty (and other district faculty if they will share), commercially purchased packages (BioQuest, Blindwatchmaker, etc.), and HyperCard stacks (Cell Bio videodisc stacks) are integrated into a graphic menu from which students will be able to choose in our Information Commons (or any other Mac on campus, or possibly via modem if they have a home Mac).

As part of this commitment to technology, I am placing my lecture notes into Persuasion 2.1. These will be used in class, as well as being available to students in the commons. Persuasion allows me to prepare and rapidly modify text, scanned and original graphics. Incorporation of QuickTime movies will finally bring dynamic processes like cell division into classrooms in an easy to use, easy to transport medium. At long last, my idea of a dynamic, visually stimulating classroom environment becomes not only feasible, but actual, due to the incorporation of computers, software, laserdiscs, and sophisticated projection delivery systems.

Biology Hi-Tech Classroom Phil Pepe PC

Phil Pepe of the Biology Department is involved in developing a high-tech classroom for his students. Some time ago, Phil envisioned a classroom full of technology and completely "chalkless." A few months later, the idea of a "chalkless presentation" was created. Some of the technology to be used in the new classroom will include the Pad Camera, computers, computer-controlled videodiscs, and videotapes. Obviously, no chalkboard will be used in Phil's classroom.

Biology HyperCard Terry Ponder PVC

Terry Ponder was the developer of the Biology Multimedia Project. It uses HyperCard stacks that allow interaction with video disc. The project utilizes HyperCard, MacroMind Director, Studio/1, and laserdisks, both separately and together. The stacks are used in class, in lab, and by the students in the Multimedia/CAI Lab. He has developed one stack on the cell, another on organic chemistry, and one on photosynthesis.

Biology Multimedia Project Gary Quick PVC

Gary Quick uses the multimedia and HyperCard materials developed by Terry Ponder.

Biology HyperCard Bob Gray SCC

Bob Gray uses MITOSIS -- A HyperCard program incorporating MacPaint graphics for the Macintosh that describes and illustrates the cell division process called Mitosis. It includes an animation of the continuous cell division events. Students were having trouble understanding the continuous process of cell division. This program was designed to not only show the continuous process but to serve as a source of study of Mitosis for quizzes and exams.

Larry Bunting in the SCC Audio Visual Department helped with the HyperCard. Terry Ponder of PVCC helped Larry Bunting with HyperCard when he ran into problems with its use. (1) A series of drawing and text were prepared which describe the cell division process. (2) The drawings and text were entered into a computer disk using HyperCard. (3) The completed program was copied onto several computer disks which were then delivered to the SCC computer lab and learning assistance center.

Students have indicated that the program has helped them understand the cell division process.

Biology Laserdisks Biology Faculty GCC
The Biology Department at Glendale Community College is currently utilizing two laserdisk players with monitors. Laserdisks are just beginning to become a useful piece of technology in the classroom. They feel that using this method of delivery is working because students are brought up watching television and the laserdisk technology is so similar. The college has the capacity to begin making laserdisks although at this time they are purchasing them or accepting them with textbook adoptions. The number of laserdisks available to students is limited at this time but the ones that are available have use in lectures on the cell and on ecology. Slides and videotapes could have been used to attain a similar result but the laserdisk provides a large variety of both. You can have over 50,000 slides plus film clips on one Laserdisk. There is little to learn in order to use a laserdisk.

Biology Computer Graphics Faculty GCC
The Biology Faculty at MCC has been working on computer assisted instruction in their department for the past eight years. The students can quickly grasp difficult concepts in Anatomy and Physiology by looking at the graphics in the context of lecture. The computer graphics are generated using programs for PC Pilot and Delux Paint II for DOS computers. The Anatomy and Physiology programs utilize EGA graphics. The programs are shown through a special 27" Multisyn Data Color Monitor that can show the high resolution graphics. At least the past three years have been dedicated to developing self-tests with graphics for BIO201 and 202. These graphics are used to reinforce written information in the self-tests. Students can take the self-tests in a multipurpose laboratory on their own time. Alternatives to the computer graphics include overhead transparencies and drawings on the white board/chalk board. The computer graphics are far superior to other alternatives.

Biology Camera Microscope Faculty GCC
The Hitachi color camera system has adaptors to fit onto the compound microscopes that are normally used in the laboratory. The camera is connected by cables to a color monitor and can use a VCR to tape histology onto a standard videocassette. The use of cameras with compound microscopes has been used for years but showed black and white pictures, still they were a tremendous asset in laboratory instruction. The color system works well in both the laboratory as well as in lecture. The tape can be used in lecture to show "live" histology in the laboratory. All students can see the material without waiting which means less confusion and frustration. This setup is also used for giving laboratory practical exams on histology. One of the reasons the camera is so popular is because of its ease of use. There is really no set-up time required since the equipment is kept "ready-to-use" on a cart that can be moved from classroom to laboratory as needed.

Biology Simulated Experiments Faculty GCC

Computer simulated experiments were developed to provide students additional experience in conducting experiments, analyzing and interpreting experimental data, decision making and drawing conclusions. Working with Drosophila to study the inheritance of traits requires more time than is available in BIO181 classes and working with pathogens is too dangerous for beginning microbiology students, but by using computer simulated experiments the students were able to carry out the experiments. DOS computers were selected for the simulations because they provided an inexpensive way of generating color graphics. These programs were developed to simulate the processes that would be followed if the experiments were actually run in lab. The idea is to empower students to make choices and decisions. It also encourages students to collect experimental data, interpret results and draw logical conclusions from the data. These programs provide a safe, timely way for students to conduct experiments. A quiz was built into the program and the students cannot run an actual test until they can correctly answer preliminary questions relating to the test first. Students have the ability to go to the review section of the program at any time.

The simulation includes 22 different species of bacteria that cause digestive diseases. Only 2 or 3 students in each class will have the same organism for their unknown. The program gives the student a very different approach to the study of inheritance than is considered in lecture. These programs are to be developed for the Macintosh platform also.

Biology Self tests Faculty GCC

Glendale Community College has been using self tests in the study labs for General Biology for Majors and Nurses (BIO181) and Anatomy and Physiology (BIO 201-202). They feel that students need reinforcement of information covered in lecture and an opportunity to assess their mastery of material covered in the class. Students have difficulty visualizing many of the concepts and processes important in biology. They need graphics and animations to help them to visualize these concepts. They also need the freedom and opportunity to study and review material at their own pace. Faculty decided to use the computer for the self tests because the computer provides an ideal medium for drill and practice and integrated question-tutorial format permitting students to switch back and forth between the two. It also is ideal for self-paced study, which allows students the freedom to stop and start again where they left off and to proceed at their own pace. The computer is also a natural medium for presenting graphics and animation sequences. DOS machines with color monitors were chosen for the self tests and both sets of tests are available on 3 1/2 in. disks. PCPilot was used as the authoring language for all self tests. Interested faculty participated in developing the questions and tutorial material for each self test. The tutorials were designed to help students think through the main question, also encouraging active participation by the students in the learning process. The self tests were used by classes and all the student answers were collected and analyzed. Statistical correlations have been calculated for use of self test and final grades. A very high correlation exists: the more self tests used, the greater the students success in the course. Students are now requesting self tests for use on home computers. This spring we will initiate a system for providing copies of the self tests for all students in BIO181 and BIO 201-202 who have appropriate equipment at home.

Business MAC&LCD/overhead Faculty PVC

Several marketing and general business part-time faculty use the MAC and LCD in class to demonstrate how to create flyers, etc. Students then use the MAC Lab and various software to create a one page flyer and a presentation.

Business MAC/IBM/Bitnet/Internet Jim Rassi PVC

Jim Rassi introduces his students to experiences with either computer they do not know and also has them participate in a demonstration of on-line systems such as Bitnet.

Business Laserdisc Bill Haggard MCC

Bill Haggard of the Business Department uses a laser disc in his Introduction to Business course that replaces video tapes and transparencies. The disc was developed by Prentice-Hall and ABC. Pictures will be beamed to the classroom from the Multimedia Department using broadband equipment. He shows integrated photographs and other illustrations controlled by a hand-held remote control.

Business Data Entry Ellsworth MCC

Barbara Ellsworth of the Business Department was unable to find a computer program to teach the course Ten Key Mastery on the Computer. She and a computer programmer developed and published a program that teaches data entry complying with standards set by three of the largest data entry employers in the State of Arizona. The program produces progress and grade reports on demand.

Business MAC/CD ROM L. Cronquist MCC

Linda Cronquist in the Business Department teaches Introduction to Microcomputers, which is an overview course. Linda uses an overhead computer viewer on a portable cart to illustrate concepts and cover work assigned. Students track their grades on a spreadsheet. They have a hands-on tour of the MAC, and are shown how to assemble a Desktop Publication document. They also are shown how to access CD ROM disks in the library.

Business Aldus Persuasion Bob Bendotti PVC
Bob Bendotti is using Persuasion to create presentations for community groups, as well as for his classes. The presentations are shown using a MAC, LCD, and overhead.

Capstone VCN Teaching K. Williamson SCC
Kimb Williamson has been involved in the IGS290 class in a multi-point delivery using VCN. She is interested in sharing ideas and information.

Capstone Electronic Forum Sexton/Adams PVC
A class journal on the Electronic Forum is used as a way for each class to interact and discuss national and world issues as well as role play.

Capstone Macintosh Sexton/Adams PVC
Students in groups create a final project brochure in the MAC Lab using Works, SuperPaint and PageMaker.

Chemistry VAX/MAC P. Silberman SCC
Phil Silberman uses CAI Programs written in Basic for the VAX and Macintosh computers and videos for CHM 130LL Labs. The CAI programs are available in the computer lab.

CAI -- gives students the opportunity to mark various concepts in Chemistry. Video Tapes -- CHM 130 students are typically new to chemistry and simply reading does not provide the necessary information for beginning students to work in lab.

Resources used were EDP and District Workshops. The planning process - CAI -- (1) Notice areas (topics) where students are having difficulty, (2) Learn language (computers), (3) Write programs, (4) Test programs with limit 4 student use, (5) Make corrections, and (6) Assign for students.

In both cases, students benefitted greatly. Students exams improved after using CAI and students were better prepared and worked much faster in lab after viewing video tape.

Larry Bunting in the Media Center assisted in producing the videos. In the future, I would like to try video disks to enhance lab videos. The approximate time to complete the projects: CAI -- 2 years; Video Tapes -- 2 years. The approximate time to learn the techniques was CAI -- 1 year; Video Tapes -- 2 months. Funding was obtained through EDP

Chemistry MS Quick Basic Dr. Lynn Lalko PVC
Dr. Lynn Lalko was the project director for the Comprehensive Chemistry Curriculum (CCC), the first totally integrated interactive video laboratory program developed for any discipline. The CCC consists of security,

records keeping, lesson management modules and the interactive laboratory experimental lessons. It was written in Microsoft Quick Basic which will run only on DOS. A Novell network stores records of student progress on a central location (file server). The PVCC system consists of 8 IBM model 70 student workstations networked to one IBM model 80 file server. Each student station has 2 meg of ram, a 40 meg hard drive, a 14" VGA monitor, a baseband network adapter and a M-motion video card. Each workstation also has its own Pioneer LDV 4200 laserdisk player which is controlled by the model 70 computers. The key component is the M-motion video card which retrieves the full motion video from the laserdisk player, integrates the video with the text on the hard drive and allows real-time interaction with the program and video via a mouse. The PVCC Chemistry Computer Interactive Video Laboratory is a complete success.

Child Dev. Apple IIe Software N. Markowski PVC
Children in the Child Development Center use various Apple IIe software to develop math and word skills.

Communication Microsoft Chart Jack Sexton PVC
Students use a Macintosh and Chart to create graphs and charts for one presentation.

Comm/Theater Video Camera Sara Soller PC
Videotaping for evaluation purposes is being used in Sara Soller's Small Group Communication classes. She feels the students are becoming more comfortable with this technology than they were just two or three years ago. More students than not are using the online catalog and indexes for reference materials for their "focus papers." Sara is also in the process of learning Project Jefferson for use with the group research project in Small Group Communication.

Counseling Apple IIe and GIS Fred Wieck PVC
Fred Wieck uses the GIS system with a Wyse terminal for students. He has 2 resume writing programs, a study skills inventory (Study Behavior Inventory), and a Career Planning Service program on the Apple IIe for students to use.

Cultural Science HyperCard Rick Effland MCC
Rick Effland of the Cultural Science Department at MCC is using Hominid Journey, Natural Selection, and Genetics modules, all of which are HyperCard based Multimedia resources he developed along with Ken Costello of MCC's Center for Teaching and Learning, and Kathy Willstein, Part Time Faculty member. Rick is using these applications to shift away from traditional lecture courses towards a learning partnership between the student and teacher. The software products run on the Macintosh SI computers located in the Information Commons. Highlights of the software include a focus on group learning and critical thinking.

Dance Life Forms/Macromind/ Labanwriter Sally Jesse CGC

An equipment loan for 1 year from the District enabled Sally Jesse to use animation with Macromind for teaching dance. She also used Life Forms, a program designed especially for dance choreography. Labanwriter was used to write choreography. Equipment for ongoing application has not been funded

Dance Video Camera/VCR Sally Jesse CGC

Sally Jesse uses video in dance classes for a "pre-test" and then students videotape themselves for each assignment.

Desktop Pub. MAC Software Sandy Belisle PVC

Sandy Belisle developed a Desktop Publishing course using PageMaker, SuperPaint, Microsoft Works, and Clip Art. A 15 station DTP lab was set up using MAC SE's with hard drives that are networked. It was a very successful project and currently the course is offered twice during the day, twice at night and once on Saturday.

Education WAIS Educ. Database Hughes/Walters PC

Billie Hughes and Jim Walters have developed a database which is being shared with the rest of the world. The project began with a need for Billie's EDU221 students to have access to more articles pertaining to education. After scanning documents from Educational Leadership Magazine into a database, with the permission from ASCD, WAIS (wide area information server) was used to allow users world-wide to retrieve the information. Twenty-four hours after the database was released, users had accessed the information from coast to coast. Jim Walters has estimated database access on six continents within the first 72 hours of availability.

Engineering IBM Software Lee/Williams PVC

Engineering students use the Excel, Word, Turbo C++, Easy Calc, and Easy CAD software on IBM PCs for problem solving and engineering drawing assignments.

English Prose F. Anttila PVC

Freddie Anttila uses Prose to review student papers and code errors on the student disk with comments for revision.

English Writer's Helper Lazarus/Teichgraeber PVC

The students use Writer's Helper in the MAC Lab to develop ideas and then to analyze and revise ENG101 papers.

English MAC&LCD/overhead Faculty PVC

Many English faculty use the Macintosh with an LCD/overhead in class to review writing examples or as a collaboration exercise, etc. Students are referred to the Learning Assistance Center to evaluate their papers with grammar checking software on the Macintosh such as Rightwriter and Grammatik. All ENG 101 classes spend time every 2 weeks in the Macintosh Lab creating and editing their papers. ENG 071 and ENG 102 classes use the Macintosh Lab as needed.

English Prose/MacProof Jack Sexton PVC
Jack Sexton uses Prose to review student papers and code errors on the student disks with comments for revision. Students have used MacProof for a rewriting exercise.

English Electronic Forum Faculty PVC
Some faculty are using a class journal on the Electronic Forum instead of a paper journal. Electronic Forum is done in the Macintosh Lab.

English MacWrite II Lang/Hum Faculty CGC
Students use the MAC Lab for English 101 & 102. The instructor station is set up with a DataShow and overhead projector. Some courses use online bibliographic databases co-developed by Larry Miller and Caryl Terrell-Bamiro.

English Multimedia Rod Freeman EMCCC
Currently, I am the author and the coordinator for the implementation of three ENG 102 sections at Estrella Mountain Community College Center using "Cultural Diversity: Immigration," the first Researcher's Electronic Notebook application authored within the Maricopa Community College District. Currently I am also authoring "An Introduction to Literature" stack in The Researcher's Electronic Notebook for implementation in ENH 110 this Fall semester 1992. Estrella Mountain Community College is a national beta test site for University of Southern California's "Multimedia Scholar" where I am also developing the first application at MCCCD: "The Classical World: Greece and Rome" for use in ENH 251: Mythology. For the inaugural opening of the "Information Commons, " at EMCCC, I am developing an interactive multimedia "Guide to Reading" utilizing HyperCard, QuickTime, and Macromind Director. The purpose of this guide is to foster reading and literacy by generating recommended reading lists to address the diverse interests of our student population specifically and the public generally.

English Electronic Forum Julie Bertch RIO
ENG 101 and 102 are taught by computer conferencing to distance students, meaning the entire student/teacher and student/student interaction is done via the Electronic Forum on the VAX.

English Word Perfect/Word Wojciechowicz SMC
Full-time faculty teach at least one computer-based composition class on either the IBM or MAC. The purpose of this program is to use the computer as a tool in the writing process. The pre-writing, composing, revising, and editing activities that can be done with the computer facilitate student learning with greater ease. The IBM classroom is

equipped with 25 IBM compatibles with Citizen printers and a Data-Show. The two MAC classrooms each have 23 computers, Kodak Data-Shows, and Ink-jet printers.

English Textra/Electronic Forum Pat Haas GCC
Pat Haas uses computers in all six English classes he teaches. The students use Textra and take computerized grammar tests. English 061 students write on the Electronic Forum and really love it.

English Textra Writer/Word Faculty GCC
The English Department at Glendale Community College has evolved from just one computer lab in the early 1980's to four fully equipped classrooms. Instead of classes being scheduled into these rooms only for lab sessions, 45 sections of English are scheduled into these rooms on a full-time basis. This allows the instructors to use the computers frequently and makes it possible for more instructional activities to include a word processing application.

Sections of English 061, 071, 101, and 102 have been scheduled into two classrooms of IBM clones and one of AT&T'S. Currently, these 37 varied sections use Norton Textra Writer. The English 061 and 071 classes use it more for self-paced work in grammar and also for sentence and paragraph writing. The English 101 and 102 classes have the benefit of the on-line grammar/writing handbook for self help in students' essays and research papers.

The classroom of Macintosh computers is scheduled for 18 sections of English 101, 102 and Journalism. These classes benefit from the power and scope of Microsoft Word. Instructors can do cooperative writing assignments--where the teacher's monitor screen is projected to a classroom viewing screen with an LCD panel. The students, as a class then work with the teacher in evolving summaries, paragraphs, and other types of writing. Or, small groups of 3-4 students, can cluster around one computer and evolve group writing assignments. All of this, of course, leads naturally into individual assignments. Giving students in-class time to do their rough drafts allows the instructor to help and advise in the actual writing process. It also encourages students to compose on the keyboard--an important goal for all future writers.

English Forum/VaxMail/Textra R. Feinagle MCC
Richard Feinagle of the English Department has developed an OE/OE English 102 delivery system utilizing the Electronic Forum, VaxMail, and the word processing package Textra. To help reach his students' needs in an unstructured environment, he has also produced video tapes to make basic course orientations available at the students convenience.

ESL Grammar Mastery Belen Servin SMC
The ESL faculty wanted students to have more practice with grammar on problems that were common but not specifically covered in the regular

course material. Computers proved to be a more effective medium than traditional methods because the work is self-paced and increases the student's access to instructional time beyond what faculty and student schedules can provide. About 95% of ESL students had no computer experience prior to taking this course, and the opportunity to gain computer literacy while studying English proved to be an important motivational factor.

ESL Speakware Rachel Leyva MCC
Rachel Leyva adapted Speakware, which is used to help ESL (English as a Second Language) students to learn English in an interactive manner. This Macintosh application utilizes visual images of real life situations and allows the students to examine the language in a manner that makes sense to them.

Fitness Center HyperCard Karen Watkins PVC
Karen Watkins was the director for the MacFit project. The Macintosh LC, color monitor, and 40 mg hard drive were used with HyperCard, Pixel Paint Professional, Computer Eyes Professional, and Canvas. Karen uses digitized pictures and color in a HyperCard stack to demonstrate exercises for specific muscle groups and provide background information on the physiology of the exercises. MacFit is being used in the Fitness Center with students. An instructor goes over the material with the student and then the student can return to review as needed. The student can also get a printout of specific exercises or an exercise program. This has proven to be an excellent asset to the Fitness Center class and is very effective in assisting the Fitness Center instructors in helping students learn about the various muscle groups and the options for conditioning them.

Fitness Center Go The Distance Fitness Faculty PVC
Students use this program which was created at PVC in HyperCard to track their mileage on fitness equipment as they strive to reach locations around the world.

Fitness Center Diet Analysis Fitness Faculty PVC
Students have their diets computer analyzed for the Fitness class, nutrition class, or the W.A.L.K.E.R. program. (IBM)

Fitness Center Bar Code Reader Pat Foley SCC
The Fitness Center uses software programs developed at Glendale Community College in conjunction with a Bar Code Reader and NCR Sentry 3000 scanner to scan information on orientation sheets and record visits by students using a bar code reader. Previously, this was typed in by hand consuming many man hours.

It took two weeks to set up the programs and one day to learn the techniques to use them. The funding came out of the Fitness Center budget.

Foreign Lang. HyperCard Viga-Acosta MCC
Carmen Viga-Acosta in the Foreign Language Department pioneered the adoption of Recoudos De La Madrid, a HyperCard based software package that was available through the publisher of the adopted textbook. This application enables the student to examine and explore the Spanish language at their own pace. Students use the software in the Information Commons outside of class time and complete 3 of 10 modules for credit. The software reinforces the pronunciation skills the students learn in class by use of its sound capabilities.

Foreign Lan. BITNET Elias Esquer MCC
Elias Esquer and other members of the Foreign language Department, along with Dr. Paul Privateer have been utilizing BITNET communications to link students of foreign language with students in other counties. Our students communicate in the language of the other countries and examine social and cultural aspects of their peers around the world.

Geography Electronic Forum/MAC Steve Bass PVC
Steve Bass uses a class journal on the Electronic Forum as a way for each class to interact and do assignments. The World Atlas and MAC Globe are used in the Macintosh Lab for additional assignments.

Health Science Electronic Forum K. Murphy GWC
Kathleen Murphy is using the Electronic Forum in her communications classes and also in her ultrasound class. They are sending and receiving messages, quizzes, etc. They are looking forward to using more interactive items in the future. She is also using the FDA bulletin board system and several other medical related type BB's, where she can get current information in healthcare, including the centers for disease control stats, which she can pass onto her students.

Hotel/Rest. MAC/IBM Jim Hogan SCC
Presently the faculty in Hotel/Restaurant Mgmt are using the following:

1. Teaching station computer (IBM platform) and color projector to:
    a. display and model real time (Hotel) Property Mgmt Systems - run a hotel system to teach with.
    b. display and model (Restaurant) Foodservice Mgmt Systems - run restaurants, real time, to teach systems.
    c. Teach computer software applications for hospitality mgmt using Word Perfect and Lotus.
2. Teaching station computer (Macintosh platform) and projector to:
    a. use MacDraw to teach graphics for marketing and customer communication in two courses.
    b. use FileMaker II database to simulate hotel and restaurant systems.

Humanities Electronic Forum Faculty SMC

The purpose for using the Electronic Forum is to provide students with a tool to learn course content while sharpening their writing and critical reasoning skills. Use of computers increases ease of composing and revising over traditional methods, and enables discussion to be shared over a much broader range than would be possible under the constraints of print media or time available in the classroom.

Humanities VCN Conkright/Jarvis CGC

An intercampus course titled "Humanities through the Arts" is being taught via the Video Conferencing Network using a pad camera. It is hosted by CGC.

LAC Macintosh, Apple IIe, IBM PC PVC

In the Learning Assistance Center a variety of tutorial software is available in most content areas that students use on their own, with a tutor, or after being referred by their instructor. Some faculty-developed software is also available on the Macintosh.

LAC IBM/VAX G. Kerstiens SCC

Gene Kerstiens, director of the LAC, provides academic support for students taking classes at SCC using three different programs of technology: (1) English Modular Minicourses (2) Academic Skills Services and (3) LAC Computerized Data management and test delivery system for all disciplines. The purposes of these programs are: (1) To provide students with modularized, audio-tutorial instruction in grammar, usage, essay writing, and writing the term paper. (2) To provide students with individualized instruction in basic study skills: study-reading, note-taking, memory, vocabulary building, preparing for exams. (3) To provide the paper-work management for data keeping and test-taking tasks in a comprehensive LAC.

The resources used were: (1) Audio-tutorial, audio resources, and commercial production: 17 authors from campuses nationwide, (2) Campus audio-resources and commercial production facilitation: one author, (3) IBM Clone computers and the VAX. The media used: (1) Cassettes, recorder, player, soundproof room, editing facilities, printing facilities, (2) Cassettes, recorder, player, sound proof studio, editing facility, printing facility, (3) Five computers with appropriate software.

The planning process involved: (1) An assessment made of requirements for English/Composition students--modules were found on their needs and categories, (2) Needs assessment survey plus pilot module, (3) Flow charts made to identify areas of need. A computer literate student was engaged to plan and execute the program. These programs have worked very well: (1) Continues to be the best selling audio-tutorial English skills delivery system, (2) Continues to be used after 15 years of service, (3) It has made LAC management much more efficient and student-friendly.

The campus services assisting were: (1) English Department Dean, (2) Computer Services. The estimated time for the project completion was: (1) 1 1/2 years, (2) 9 months, (3) 1 year. The funding obtained for these projects was through: (1) Commercial Funding, (2) Commercial funding, (3) LAC Budget.

Library On-line Library Cat. Shelle Witten PVC
Shelle Witten has used a MAC and LCD with a connection to the Library On-line system and some Aldus Persuasion slides for library orientations.

Literature Electronic Forum Lit Faculty PVC
The Literature faculty use a class journal on the Electronic Forum as a way for each class to interact and discuss the literature and themes.

Mathematics HyperCard Jim Tipton MCC
Jim Tipton in the Math Department has developed a HyperCard application that he uses to present his lecture notes and graphics to his classes. Jim prepares mathematical models using various Macintosh applications and then imports the graphical output to HyperCard. He can then use the searching powers of the HyperCard package to locate and display these graphics in a free form manner to illustrate key points in his lectures.

Mathematics T1-81 John Losse SCC
John Losse uses (1) The TI-81 (A Graphing Calculator) and (2) CactusPlot: A Mathematics Utility, especially for College Algebra, Trigonometry, and Calculus.

The idea is and was to use modern machines and software to (1) Reduce computational time, (2) Provide more realistic examples, (3) Where possible, expose classes to problems otherwise too difficult to tackle, and (4) To teach traditional concepts in a better way.

Resources used are (1) For the TI-81, the overhead projector version, which we purchased for about $300 and (2) For CactusPlot, campus computers, both Macintosh and IBM, large monitor or projection device, and software written by myself. The implementation into the classroom required very little planning. These programs have worked out Very Well!

Writing the Cactus Plot software took about two years for a usable product, and after a decade, is still being expanded. Learning software development took 3 to 4 years. No funding was obtained for the software development and computers already available were used. (Implementation of the TI-81, on the other hand, took a matter of days.) TI-81 was purchased with department funds.

Mathematics HyperCard Alan Jacobs SCC

Alan Jacobs developed MAT055 Software, a set of tutorials and exercises for the complete MAT055 Arithmetic Review course. Written in HyperCard for MAC computer with hard drive. MAT055 really needs to be taught in an individualized mode. Tutorials seem a logical way to accomplish this.

First step was a summer project--Instructional Computing Fund for me and 3 other faculty. Second step was a one year sabbatical for me to redo and complete the project. I've been wanting to do this since 1980. Now both the computing environment and sabbatical opportunity came together. So it's been in my mind, planning, for a decade.

The tutorial has been in use for one semester. The results are promising. This is better than a book because it invites student interaction. It is better than a lecture because students can work individually. Perhaps there are other media which could enhance this, but I can't think how.

The estimated time to complete the project was 1200 hours, when the content was fairly clearly defined. You could say it took a lifetime to learn the techniques used to develop this software. Actually, probably 2-3 weeks to develop some speed with HyperCard programming/authoring.

Funding was obtained first by Instructional Computing Fund (Dist) and second by Professional Growth -- Sabbatical.

Mathematics Derive Jo Steig MCC

Jo Steig is currently using the computer algebra Derive in her math classes. This semester she is using it in Calculus I (MAT 223) and in the fall will be using it in Calculus II (MAT 224) and college algebra (MAT 153). She is using it as a tool demonstration device, a tool for the students to use in homework assignments, and a tool for exploration. This is the first semester that she has used it for instructional purposes so assignments and uses continue to change in response to her experiences. At this time she sees a three level introduction of a computer algebra:

1. Teach the students the basics of the software (about 1 hour)
2. Show the students that used properly it can save them time and can help them to improve their performance in a class
3. Encourage them to explore mathematical concepts with the algebra and to use it to look at a problem from a variety of angles.

Mathematics Derive M. Holtfrerich GCC

Michael Holtfrerich is currently using High Tech in his second semester calculus course. He is giving out computer assignments about once every two weeks. In his night class he is having his students do a group project using the computer. He also uses the computer in class to demonstrate concepts that are more easily shown using the computer. The programs that he uses are Derive, which is a very powerful computer algebra system and MMP, which is a graphing package. He and Jeff Kruse gave a talk at the All Faculty Convocation letting math faculty know what they have done with the computer. He is also requiring his students to use the Electronic Forum.

Mathematics Math Lab Software G. Barrientos SMC

The main goal of this program was to improve student success in mathematics. Additional goals included facilitating the transition of students with computer learning, and greater use of the tutors in the LAC and the computers available to students on campus. All instructional software must be available in Apple IIe, Macintosh, and IBM formats to accommodate all students. A major benefit of the program is to increase immediate feedback to students while working problems, thereby increasing frequency of practice, learning and retention and decreasing math and technology-related anxiety.

Mathematics Maple V/TEMath/Excel Chandler/Field PVC

Betty Field and Ed chandler are team teaching MAT 223 Calculus I using MAC LC's in a lab setting. Every class meeting is in the MAC lab and there is a MAC LC (4 meg RAM, math coprocessors, color monitors) for every student. There are 28 stations with the coprocessors on half of the computers. They are using MAPLE, EXCEL, and TEMATH. The purpose of using this technology and software is to actively involve the student in learning through graphical, numerical and analytical analysis of every concept.

Mathematics TEMath/Kemeny-Kurz Chandler/Field PVC

Ed Chandler and Betty Field use TEMath and other math software in class with a MAC and LCD on an overhead. Students use various Kemeny-Kurz math software such as Algebra, PreCalculus, and Calculus in the MAC Lab.

Mathematics TI-81 Calculator Faculty PVC

The students of Ed Chandler, Larry Burgess, and J. D. Williams use the calculator in class every day for graphing functions. They also use it to display graphs in class.

Mathematics Kemeny-Kurz Math Faculty PVC

Students use various Kemeny-Kurz math software such as Algebra, PreCalculus, and Calculus in the MAC Lab. They also use them in class with a MAC and LCD on an overhead.

Mathematics HyperCard Bill Hammers PVC

Bill Hammers has developed (and published) HyperCard stacks which are currently being used in the Learning Assistance Centers at PVC and SCC. He is presently working on putting the entire MAT077 class on computer-based instruction.

Mathematics TK Solver J. D. Williams PVC
J. David Williams has students solve engineering problems using TK Solver on IBM PCs.

Music Computer/Synthesizer Chalma Frost PC
Music-making in the commercial world is being made in many home studios, where once it was all made in Hollywood or New York in recording studios. PC is developing a certificate program to cover the needs of the musician who is already writing songs, commercials, etc., but need or want further formal training with his/her own equipment, or want the basics of computer/synthesizer generated music. The lab at present has 12 student work stations and a teachers station. Chalma Frost is currently putting together a community advisory committee of working musicians from a lot of areas - performance, video, film, recording, to help determine what is needed in the work world.

Music MacGamut/VCR Marc Denton CGC
The video camera and VCR are used to observe, evaluate and receive feedback for voice students. MacGamut is used for music exercises (notation, rhythm, interval, scale, chord) for music theory students.

Nursing Tutorials/VAX and MAC Faculty SCC
The Nursing Department uses tutorials on the VAX for medical terminology and math tutorials on the Apple IIe computers. The medical terminology tutorials are teach lessons written several years ago using an authoring language. The math tutorials were written in basic by Becky Ripley approximately seven years ago. Both are available in the computer lab. They have been in continuous use for over seven years and have proved to be very effective. One hundred percent of the nursing students completing the nursing program at SCC pass the national exams.

Nursing HyperCard C. Keyworth MCC
Claire Keyworth has scanned graphic images from textbooks and outlines for her notes into a HyperCard stack that she uses to deliver her lectures. Claire also utilizes a DOS tutorial to acclimate her students to computer based applications they will use in their forthcoming careers.

Nursing HyperCard E. Bramoweth MCC
Ellen Bramoweth of the Nursing Department uses a computer to help her present a paperless lecture using multimedia presentation tools. She uses a custom HyperCard application developed along with Ken Costello of MCC's Center for Teaching and Learning that allows her to mix both still and live video in an interactive manner. The computer enhanced delivery relies on video disks, a pad camera, and a projector to provide full color computer graphics and text. A custom teaching station permanently installed in the lecture hall allows seamless

integration of all the equipment, along with access to the broadband TV network, which allows delivery of satellite and broadcast television in the classroom.

Nursing HyperCard Tetting/Gordon PC

The Nursing Department through the leadership of Dan Tetting and Ruby Gordon has developed a course supplement on the computer using HyperCard stacks. The program allows nursing students to experience sights and sounds observed by nurses when examining a client. One example involves blood pressure measurements. Students can use "virtual instruments" (on the computer) to monitor a client's blood pressure (usually a virtual client), check a client's pulse, and even listen for sounds indicating possible conditions. This technology was developed as a test for nursing students, but has since been proven most effective as a study tool.

Nursing Toolbook Faculty GCC

The Nursing Department, in cooperation with the Innovation Center/Authoring Center has developed electronic testing for the Nursing Department, using Toolbook. This has gone online this semester (Spring, 1992). Toolbook was selected because of the wide range of interactions that can occur. Toolbook can incorporate graphics, animation, full-motion video and eventually sound, music and touch screen. Toolbook can be set up to be very user friendly upon presentation to students. Audio-Visual Connection for OS/2 was considered, but it is strictly a presentation package, and the other tester packages only provided limited response questions.

The Innovation Center, in particular Harold Swanson and Larry Fuller, have provided much support to the nursing department for this project. The project should take about 5-7 months for full completion, though it is being used in it's infant stages right now. The learning curve for Toolbook is very steep. The first month was spent learning the basic functions of Toolbook and learning the "scripting" language. Once the testbook is written and tested by the Innovation Center, learning to administrate it is a very short orientation. The hardware and software utilized will be a system that can use Windows, plus Windows software and Toolbook and Excel. We will be testing this both stand alone and on the Novell network this semester. Excel is used for grading analysis. As of this writing, the first tests have been administered to the nursing students. Some bugs in the program were found, but overall the program has run very smoothly. The response from the students was very positive. Eventually we'd like to interface the results file with INFORM to eliminate the need to record scores by hand.

Physics Vernier/Excel/Word Millard Lee PVC
Millard Lee's students use Excel and Word on IBM PCs for physics class and lab assignments. The data acquisition packages allow students to make on-line measurements of time-dependent variables and then analyze the data and plot graphs.

Physics IBM PC B. Arenson MCC
Baron Arenson of the Physical Science Department uses technology in physics to demonstrate the modeling of a physical system. As an example, the students in the PHY 111 laboratory program launch a rocket to three different altitudes using three different rocket engines. Using the specifications of each engine such as thrust force and burn time, they model the rocket flight on an IBM PC to investigate the nature of the air drag force acting on the rocket as it rises. They determine the air drag coefficient which gets the computer rocket to the right altitude at the right time. This interactive method allows the students to discover the proper variables by trial and error.

Physics Works Mary Harris PVC
Mary Harris leaves a physics lab report template created with Works in the MAC Lab for students to use.

Psychology HyperCard D. Rebadow PVC
Donna Rebadow developed multimedia materials on the brain and nervous system for her Introduction to Psychology class and Drugs and Behavior class. She combines HyperCard stacks with videodisc and animation. The stacks have brought to life very difficult concepts. Students report the ease in which they learn the material.

Psych/HES/E.Lit Electronic Forum Rebadow/Adams PVC
A combined class journal (Sybil) has been set up so that students from the 3 classes may interact from the view of their subject matter as they discuss common themes.

Psychology/HES Electronic Forum D. Rebadow PVC
Donna Rebadow uses a class journal on the Electronic Forum for Introduction to Psychology class and Drugs and Behavior class as a way for each class to interact and discuss current topics related to the content.

Reading Word Attack W. Matthews CGC
Word Attack is being used to support reading courses.

Reading MacEnglish/HyperCard Rachel Leyva MCC
Rachel Leyva in the Reading Department has pioneered the use of MacEnglish, a HyperCard based Macintosh application. This application features the capability to digitize the voice of the student and then replay it, compare its wave form graphically on the screen, and provide

feedback on the intonation and pronunciation to the student. The program requires a CD-ROM player, and is used outside of the class time in the Information Commons.

Reading Electronic Forum Butler/Rings PVC
A class journal is being used on the Electronic Forum as a way for each class to interact about readings.

Reading/Writing MAC Jane McGrath PVC
Jane McGrath uses MAC and LCD/overhead for classroom presentations created in Persuasion and to demonstrate writing tools such as spell checkers, grammar checkers, etc. Word processing programs (Works or MacWrite) are used to revise and edit writing samples during class demonstration; also using Write Pro in class with a MAC and LCD/overhead as a guide to fiction writing.

Sociology Aldus Persuasion Umar Sharif PVC
Umar Sharif uses Persuasion to present information in his Intro. to Sociology and Racial and Ethnic Minorities classes via a MAC, LCD and overhead.

Speech Videotaping Linda Larson MCC
Linda Larson in the Speech Department utilizes videotaping and playback equipment to assist her students in her speech classes. The students are taped giving their speeches and presentations to the class, and then can watch the playback to critique themselves.

Technology "Link" System Faculty GCC
The instructors in the drafting and Autocad department use the "Link" system. This is installed in a classroom of 24 IBM PS/2 computers and a clone at the instructor's desk. What the link system does is allow the instructor control over the student's computer. The instructor may put whatever is on his screen on all, several, or one of the student's systems. He may project another student's screen on all other screens and also he can put what is on a student's system on his system One other important feature is the ability to "blank" all student screens. This system has been in place for about 3 years and training for it takes only a couple hours.

Theater Computer/Synthesizer V. Ludders GCC
This year at GCC Virginia Ludders has used the computer and an orchestration program to place the entire musical score for the musical "Oliver" on computer which is then played back through a synthesizer and recorded on reel to reel tape. The tape instead of musicians will be used in the production to accompany the actors and singers. This solves the problems of finding enough trained musicians who will volunteer to play for the musical, having to pay for a conductor, having quality music

with tempos which remain the same throughout rehearsals and performances. This was an experiment this year which appears to be working.

She also designs and does the layout for the programs they hand out at the performances on her office computer. If the computer was able to handle a desktop publishing program she would be able to do more for publicity and programs. Virginia also has a student who is working on a program which would facilitate easier record keeping for ticket sales. It would list the performance names and number of seats reserved and the total dollar amounts generated from general, student, senior citizen, and group sales. She continues to look for ways that technology will aid in making the job of producing theater easier and better.

Theater Arts MacDraft K. Williamson SCC

Kimb Williamson uses MacDraft and generic cad software programs with a Macintosh SE and LCD projector to present concepts in a quick, clear, and efficient manner. Resources used in developing this project include conference and workshop materials from the U.S. Institute for Theater Technology and a MAC/LCD projector unit on the SCC campus. The initial acquisition of hardware is attributed to the Instructional Technology Fund and the administrators who make those decisions.

Major planning/preparation involved lecture presentation materials of instructor generated graphics. This project is ongoing but to this point has taken approximately 83 hours. The knowledge of the hardware has developed over several years. Continue to enhance, add, change, update, and try new software each semester.

Due to the positive response/evaluation from the students, continue to develop more ways of presenting the material. The accuracy and thorough quality of the visuals sure beat "chalk talk." The next step is developing some HyperCard stacks using an animated modeling/rendering program with a bigger machine. Some alternatives might include CD ROM.

A Faculty Review of Technology and Change

by Patricia Harris

Background

Technological literacy is an exciting idea. Computer literacy was a shortsighted term (Nickles, Culp, & Polin,1988). It is not enough to be computer literate, one must now be technologically literate. Knowing about a computer means knowing about only one of the many things that will change education. Becoming technologically literate means learning new things, and this is exciting. One of the most difficult tasks most of us faced in developing this report was to stop learning about technology long enough to track its presence in our District and then write about it.

We are poised at the onset of an exciting revolution:

- A revolution that promises to fundamentally change education.
- A revolution in the tools used to both teach and learn.
- A revolution that will dwarf any change to date, including Gutenberg's movable type and Edison's electricity (Young, 1988).

Using technology in the classroom gives us the ability to revolutionize education.

It is thought that technology will change the role of the teacher, and for some this is frightening. Once students gain access, through technology, to vast quantities of information as they now are able to do through our libraries, teachers will need to purpose in their hearts to help them process this information. Teachers will then be able to help students find, retrieve, process, summarize, evaluate, reformat, and communicate information. The point is, teachers will not be teaching information, they will be teaching students how to use information. Teachers could rapidly become what John Sculley (1987), CEO of Apple Computers, calls "knowledge navigators." Teachers and students alike would do "knowledgework." The change in paradigm from information-giver to knowledge navigator would fundamentally change the teaching itself (Nickles et al., 1988).

Technology gives us new tools with which to teach and learn. Instead of writing with paper and pencil we can use a word processor with a spelling checker, thesaurus, and style analyzer. Instead of note cards, students will use HyperCards. Instead of card catalogs, book indexes, and The Readers Guide, we will use knowledge-retrieval software. Instead of calendars, teachers will use scheduling software. Instead of vertical picture files, teachers will use videodiscs. Besides writing term papers, students will produce and edit "video reports." New tools like these will make teaching more efficient, more creative, and more productive.

Technology allows the learning and teaching to be a more visual experience. Today, students learn primarily by listening and reading, but not in all cases as this report substantiates. However, for the most part, students today learn by working with words--either spoken or written. Advances in video technologies and image processing will change this. Using resources like The Video Encyclopedia of the 20th Century, students can see history as it was made--no more just talking and reading about history. Making learning more visual will greatly benefit the large number of visually-oriented students.

Technology will change education by making it more interactive (Young, 1988). Speaking to faculty who have investigated and studied the student's perspective, education, to them, is like watching a movie. The student sits and the movie proceeds from beginning to end. The lecture is linear, the textbook is linear, even the test schedule is linear. School events go on as scheduled by others. There is a script and everyone is acting his or her part--in order. There is no way to stop the movie, speed it up, or interrupt it. The student must interact with the school because the school will not interact with the student. The learning agenda is fixed. Faculty seem to have taken on teaching with technology, particularly computer-assisted videodisc and interactive CD-ROM devices because it will help create a learning environment that changes and empowers learning by interacting at an individualistic level with students' needs.

Changing--a process

Educational change can be viewed as a set of outcomes or as a process (Keller, 1987). If change is viewed in terms of desired outcomes, then goals and time lines are needed. If, on the other hand, change is viewed as a process, then various subprocesses must be implemented.

John Muir, former director of the National Park Service, once said, "When we try to pick out anything, we find it hitched to everything else in the universe." If we have learned anything from ecology it is that the environment consists of a web of interacting processes. To apply an ecological or environmental perspective to technology in our District, we must think about interacting processes.

From study, this researcher proposes that to change the District using technology more, educators must nurture what is proposed as seven processes. The processes do not form linear progression, but rather a continuous series of loops. Success in using technology in the classroom is to then improve education--depending upon how well the following processes are nurtured.

Importation. There is no reason to reinvent the wheel. Innovative uses of technology must be imported from other schools, businesses, museums, libraries, and universities. Faculty and staff members should read widely and travel extensively to import and study ideas, methods, media, and instructional technologies which may already be effectively in place. Local resources should also continue to be identified and assembled, as this report demonstrates on a small scale.

Information amassment. Newer technologies, especially optical memory, allow storage of vast amounts of information. A single CD-ROM disc, for example can hold 2.5 million pages of text. Videodiscs, CD-ROM, and other mass-storage media must be acquired, catalogued, and mapped. Databases and hypermedia will be designed to act as road maps or atlases to mass-memory devices. (It is not enough to amass information, it must be highly accessible and usable.) Carefully indexing amassed information and media will be a priority.

Accessibility. Resources, especially information-rich resources are valuable only if they are accessible. Students, faculty, staff, and administrators seem to need easy access to teaching and learning resources and information. All avenues that can increase access to the amassed information will need to be explored. Methods of access must be transparent and efficient. The supporting computer network could then possibly use artificial intelligence or query techniques that encourage and track individual queries and preferences.

Linkage. New technology must be linked to the curriculum. Every goal and objective in our curriculum guides should be linked to videotape, videodisc, print, computer-assisted instruction programs, optical memory, and other resource material, media, and information. Newer forms of hypermedia software will allow an intimate association between high-tech resources and the core curriculum. Specifically, long-range lesson plans will become a lively assemblage of media, materials, and methods--cross-referenced in new and exciting ways. Powerful relational databases will help us build and manipulate these linkages.

Monitoring. These processes require continual monitoring. Educators must constantly judge if, for example, enough information is being amassed. Processes always require nurturing and constant attention. Organizational structures must be created to monitor the processes of amassment, linking, assessment, and importation.

Support. As people march toward planned futures, they must be supported in new and innovative ways. This support must come from a variety of sources--both in and out of the school system. Drudgery and paperwork must be reduced.

Planning. Change requires careful planning. Curriculum revision and enhancement both require planning. In addition, a financial plan with adequate funding levels for the necessary acquisitions must be developed. Educators will need to enlist experts from business and industry to help use their strategic planning processes. These processes, like Total Quality Management (TQM), should soon be sustained in schools, at both the organizational and personal levels. In-school-service structure should support these processes. However, teachers must first personally support these processes: for example, individual teachers must link new forms of media to their day-to-day lesson plans. Without both administrative and personal support, a process approach to implementing advanced technology will not succeed.

Change goals. Another way to change schools using advanced technology is to develop concrete goal and time lines (Burke, 1982). Of course, goals and time lines will vary from school to school and can easily coexist with the process approach previously discussed. Since some schools are further along than others, technologically speaking, goals and time lines will vary.

One way is to continue or further the creation, where possible, over time, of a curriculum that is a lively assemblage of print, audio, video, graphics, computer programs, and hypermedia (Keller, 1987). Hopefully, long-range goals give a general idea of the ways we, one day, will see technology utilized in our District. The keys are to learn from the here-and-now to apply in the future.

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STANDARDS

By: Mannay Griego, GCC
Juan Marquez, DIST
Don Shehi, DIST

Charge:

Develop and annually update a set of standards for new facilities and renovations which take into consideration advancing instructional technology.

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Committee Members

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David Waters, DIST
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Introduction

The 1991-92 Ocotillo Standards Committee was charged with reviewing and updating Revision 1 of the document, Technology Standards and Guidelines for the Maricopa Community College District, and presenting it to those who will frequently use it.

Year in Review

A timeline for completing Revision 2 was established at the beginning of the 1991-92 school year with March 24, 1992 as the deadline. Copies of the 1990-91 document (Revision 1) were re-distributed to the Computer Coordinators Committee for review, while the Standards Committee continued reviewing all sections of the document. A consultant was retained to rewrite Standard C: Twisted Pair for Duplex Voice/Data Jacks and to develop standard symbols for voice, data, and video.

A Local Area Networking (LAN) Subcommittee was formed to investigate and provide information on LANs employed at all colleges. However, since a comprehensive project is underway to acquire similar information, it was decided not to include the LAN information in the Standards document.

In addition to updating existing standards and guidelines, the following two items were added:

- **Appendix F**: Standard Symbols for Voice, Data, Video
- IEEE 802.3 10BaseT Twisted-Pair Ethernet Cabling (in **Standard B)**

Following are standards/guidelines which we plan to include in the next document version:

- GUIDELINE B: T1/DS1 MICROWAVE NETWORK
- Fiver and ISDN cabling
- Security video

Approximately 50 draft copies of Revision 2 will be distributed to the following areas:

- telecommunications coordinators
- computer coordinators
- media directors
- Legal Department
- faculty
- administrators.

Future Goals

Revision 2 of the Technology Standards and Guidelines for the Maricopa Community College District should not be considered to be complete, since it will continue to evolve. A standing committee should continue to review and update the document.

The committee continues to consider implementation of an electronic medium through which the document can be updated and disseminated.

Finally, Don Shehi, Juan Marquez, and Manny Griego would like to express their appreciation to the Standards Committee members for their help and cooperation. Also, our special thanks to Diane Bondurant, Ken Baer, and Lionel Diaz: Diane and Ken for their extra efforts; Lionel for his commitment to the document by providing funds to have standard symbols developed for voice, data, and video (Appendix F), and for having an outside consultant rewrite part of the document.

TECHNOLOGY STANDARDS
AND
GUIDELINES
FOR THE
MARICOPA COMMUNITY COLLEGE DISTRICT

Ocotillo Research/Action Committee
on
Technical Standards

Revision 2
April 1, 1992

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INTRODUCTION

This document identifies technology standards and general guidelines which are to be observed in the remodeling and new construction design of information technologies facilities for the Maricopa Community College District (MCCD or District). The prime purpose of this document is to cite the areas for which standards have been developed, and to direct the reader to appropriate reference material for detailed information. Wherever standards do not exist, this document recommends guidelines which have proven to be successful in District construction/remodeling projects. Standards and guidelines described in this document are not intended to supersede any state or local laws or codes.

The following information is included in Appendices.

[] Appendix A: Wiring for buildings
[] Appendix B: Pin outs for data adapters, punch block, and terminal servers.
[] Appendix C: Glossary of terms.
[] Appendix D: Specification checklist
[] Appendix E: Ocotillo Standards Committee Members
[] Appendix F: Symbols for Voice/Data/Video

Because of the inherent nature of changing technologies, this document cannot be considered to be complete. What are presently considered to be standards will continue to evolve due to changing technologies. Areas where experimentation has been the mode for planning and application will eventually evolve into standard operations to be followed by ensuing construction projects. Once standard, those areas will also continue to evolve.

It should be noted that any changes, additions, and/or deletions to District computer/telecommunications systems must be reported to District Network Support through Jan Baltzer.

DISCLAIMER

Vendors are referenced in this document only to provide the reader with potential sources for information on specific devices and/or systems. No recommendations, explicitly or implicitly, are suggested. Prospective vendors who wish to be added to MCCD vendor lists, should contact the Director of Computing and Communications at the Maricopa Community College District Office.

STANDARDS AND RECOMMENDED GUIDELINES

The following areas are considered to be standards, and therefore should be adhered to in project planning and development.

[] Documentation and Labeling
[] Baseband/Ethernet Cabling
[] Twisted Pair for Duplex Voice/Data Jacks
[] Distribution System Requirements
[] Pin-outs/Connectors/Termination Devices
[] Coaxial-based Broadband

The following areas are recommended as guidelines to assist in project planning and development.

- [] Engineering/Environmental Considerations
- [] T1/DS1 Microwave Network
- [] Relationship of Voice/Data/Video Communications to Electrical Environment
- [] Security Systems
- [] Entrance Facilities
- [] Outside Plant Conduits
- [] Conduits Within Buildings
- [] PhoneNET LANS
- [] Space Allocation for Distribution Equipment

VOICE/DATA/VIDEO CABLING POLICY STATEMENT

OBJECTIVE

Prior to divestiture of AT&T and implementation of the District-wide Telecommunications Improvement Project, requirements for telephone cabling were accumulated by the individual colleges until sufficient quantities existed to request service from either Mountain Bell or AT&T. Requests for data wiring were made directly to Computer Repair Services and installations were completed as resources became available. Installation of data cabling throughout the District has required as many as three full time employees at one time.

MCCD now has total responsibility for voice, data, and video cabling. This includes responsibility for physically placing the cable and for maintaining both hard copy records, in the case of video cabling, and cable plant records for voice/data cabling cross connects. This responsibility provides an opportunity to establish standards and guidelines which will ensure that future voice/data/video network expansion and cable plant integrity can be maintained.

In order to implement such standards and guidelines, it is necessary for the Colleges and the District Office to jointly share responsibility for planning, implementing, and funding future additions and changes to the cable plant. Without standards and guidelines, and adherence to them, it will be only a matter of months before the current cable plant installations begin to look like the old cabling network that had been previously replaced. A return to undocumented or poorly installed cable plant would result in significant additional expense when network expansion is deemed necessary.

POLICY STATEMENT

To improve the decision making process involving additions and changes to the voice/data/video cable plant, it is necessary to decentralize needs analyses. This procedure allows each college or department to determine the pro's and con's between their "must have" and "want to have" cabling requirements. The college will also be able to determine if it has technical staff to perform the addition or change, and to maintain cable plant records. In the event that a college does not have qualified staff, it may choose to contract out the work with MCCD approved vendors. An MCCD approved vendors' list may be obtained by contacting the MCCD Purchasing Office at telephone number (602) 731-8000.

If a college chooses to perform its own installation, it will be responsible for maintaining the wiring standards and installation quality cited in this document. The college will also be responsible for updating the hardcopy cable plant records and jack maps as well as the cable plant records.

Cable plant installations and documentation will be audited by the District Telecommunications Office on a regular basis. If, in the course of these audits or in the course of daily operations, it is determined by District Telecommunications or Computer Repair Services personnel that any of the college installed cabling does not meet the approved standards, or that cable plant documentation has not been adequately maintained, the District Telecommunications Office will be allowed to contact an approved outside vendor to have the non-standard area brought into compliance and will back bill the appropriate college for the charges.

It is strongly recommended that the District Telecommunications Office and District Computer Repair Services be included in any planning for voice/data/video service additions/moves or changes that would affect entire departments or large employee work groups.

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STANDARDS SECTION

STANDARD A: DOCUMENTATION AND LABELING

Documentation will consist of Cable Records, Test Records and Record Drawings prepared by the Vendor and submitted in original form on vellum or other reproducible media for advance acceptance by MCCD.

CABLE RECORDS

The vendor shall prepare and submit complete and accurate cable records showing every splice and cross-connect by cable, pair and terminal number. The cable numbering system will be consistent with that already established by MCCD.

TEST RECORDS

Every pair in every cable must be tested on an end-top-end basis after splicing and terminating. Defective pairs will be clearly identified as defective at both ends of the cable. Test record forms must be submitted to MCCD upon completion of tests. Maximum allowable defective pairs will be limited to 1% of the total number of pairs and a maximum of two (2) pairs per 25-pair binder group.

STANDARD SYMBOLS FOR VOICE, DATA, VIDEO

Symbols used in drawings to depict voice, data, and video outlets shall be those which are illustrated in Appendix F. Selection of all devices must be approved by Information Technology Systems and Facilities Planning and Development staff prior to issuance of construction documents.

RECORD DRAWINGS

Site drawings will be supplied on reproducible material. These drawings will include the following:

1. Distribution cabling system
2. Exact route of total outside plant including trenching and tunnel routes
3. Depth of cable trench
4. Locator coordinate measurements from cable location to nearest building.
5. Cable pair count, wire gauge and cable lengths of every cable included in the system.
6. Conduit fill ratio

FLOOR PLAN DRAWINGS

The following are minimum requirements for floor plan drawings.

1. Entry and IDF terminal locations
2. Riser drawings showing corrected terminal location numbers' and conduit sizes

NAMEPLATES AND TAGS

It is MCCD's practice to place some form of identification on each cable and piece of equipment, conduit and terminal enclosure. Vendor shall provide and install MCCD approved marking tags to meet this requirement. Polyethylene tags secured by nylon cable ties will be used for all locations. Lettering shall be reflective black on yellow background for all markings. Tags on terminal locations shall show the cable sheath identification.

Identification markings shall be made at the following types of locations:

[] All cross connect terminal boxes
[] Both in and out sides of manhole or pullbox/manhole where underground cables have been spliced within a manhole or pullbox/handhold
[] Exposed conduits near each end and approximately every 100 feet
[] Cables at the entry point into a building, both inside and outside
[] Splice cases for line splices, diminish/taper splices, terminal box splices and secondary cable stub splices
[] Marking specifications apply equally to twisted pair, fiber optic and broadband systems

STANDARD B: BASEBAND/ETHERNET

The different ways of physically connecting devices with each other on a network are commonly referred to as topologies. For example, the common-bus topology is one of several available topologies. Physical connection in this type of system is usually, but not always, a coaxial cable by which any number of devices can be tapped into.

Ethernet is a network which is implemented in a common-bus topology, typically with a 50-ohm coax cable. Data are transmitted directly as digital signals at a rate of 10M bits per second. With this type signal, only one device can transmit at a time. This form of data transmission is referred to as baseband.

Baseband standards for Ethernet are derived from Digital Equipment Corporation (DEC) Ethernet standards. Other documentation, such as network configuration maps, may be obtained from the MCCD Net Support system. Additional Ethernet specification details can be obtained from the following sources.

- MCCD Systems Manager at Information Technologies Services (ITS)
- Account Executive at Digital Equipment Corporation (DEC)
- Network and Communications Buyer's Guide, DEC

THICK WIRE CABLING

The following standards should be observed when planning for standard (thick wire) Baseband/Ethernet cabling:

- A single cable segment can be up to 500 meters (1640 ft.)
- Multiple cable segments can be linked together with barrel connectors. A maximum of 100 transceivers (H4000) can be used on standard Ethernet cable segments. A repeater or bridge connects segments of Ethernet coaxial cable, creating larger local area networks (LANs).

THINWIRE BASEBAND/ETHERNET CABLING

ThinWire Ethernet cabling runs using BNC connectors can be up to 185 meters (600 ft.) and are connected to thick wire segments via a DEMPR or DESTA.

IEEE 802.3 10BaseT TWISTED-PAIR ETHERNET CABLING

The following standards should be observed when planning for twisted-pair/ethernet cabling.

- A concentrator (repeater) port may support only one workstation.
- Unshielded twisted-pair cables require two pairs of wire.

CONNECTION OF OTHER LANS TO ETHERNET

As specified by the Net Support guidelines, other local area networks (LANs) may be connected to the Ethernet Baseband if they comply with the following criteria.

- LAN documentation provided for Net Support
- LAN meets MCCD preferred connect method formats in connecting to the following.
    1. The universal cable plant
    2. Ethernet
    3. Microwave

[] Connecting devices must be among the following MCCD approved units.

1. Kinetics Bridges
2. Delni (DEC)
3. DECservers (DEC)
4. MUXserver (DEC)
5. Vitalink Bridge
6. DEMPER/DESTA
7. 3Com bridge
8. Novell bridge
9. PC Ethernet

STANDARD C: TWISTED PAIR FOR DUPLEX VOICE/DATA JACKS

The following standards shall be observed when planning for twisted pair voice/data jacks.

OUTLETS, JACK, AND WIRING - EXISTING BUILDINGS

The purpose of this section is to identify standards in place prior to adopting this document. In 1984, all campuses in the District were re-cabled by US West using two three-pair (UTP) throughout. The recommendation is to "maintain" that standard, i.e., two three-pair, where new outlets are added or existing outlets re-located in existing facilities. Where complete new structures are built, standards for new construction shall be followed.

Outlet Boxes

The contractor shall install a standard 4" sq. x 2-1/8" deep box with appropriate ring at each V/D jack location, with 1" conduit stubbed up 6" above accessible ceiling space. Where ceiling space is not accessible, route conduit back to distribution space (IDF/MDF). Boxes shall be at a height consistent with all other outlet boxes in the area unless otherwise specified. Faceplates (material and color) shall be consistent with other faceplates in the area.

Jacks

Jacks shall be AT&T 106BFD or equivalent. Any proposed equivalence must be authorized by the District Telecom Coordinator. The jack shall be installed and numbered in sequence with other jacks in the building. Numbers must be coordinated with existing sequence to facilitate maintenance. The wiring diagram in Appendix A shall be precisely complied with.

Wiring

Any change to wiring standards is subject to approval by the District Telecom Coordinator. It should be noted that once a wiring method has been selected, it must be followed without deviation.

There shall be at least two (2) THREE-PAIR twisted-pair 24-gauge wires to each jack with standard telco color code (blue/white, orange/white, green/white, brown/white), and wired in a standard telco RJ-11 configuration. The "VOICE" RJ-45 shall support voice, data, or integrated voice and data services; also, standard, electronic, or digital sets, and control functions as required by the telephone system. This wiring shall be two (2) pairs of twisted-pair wiring. -Voice cable pairs will be terminated on separate, individual 66 type connector blocks from the data cable pairs in each IDF.

All voice pairs will then cross-connect to the building riser cable connector block located in the same closet, and will be extended to the main distribution frame. The other three RJ-45s will be wired with two (2) pairs of twisted-pair wiring each. This wire will run from the outlet to the appropriate floor intermediate distribution frame, terminated on "DATA 66" type connector blocks and cross-connected to the building riser cable connector block located in the same closet and will be extended to the main distribution frame. The wiring diagram in Appendix A of this document shall be followed exactly.

OUTLETS, JACKS, AND WIRING - NEW BUILDINGS

Outlet Boxes
Contractor shall install a standard 4" sq. x 2-1/8" D box with appropriate ring at each V/D jack location, with 1" conduit stubbed up to 6" above accessible ceiling space. Where ceiling space is not accessible, route conduit back to distribution space (IDF/MDF). This box shall be at a height consistent with all other outlet boxes in the area unless otherwise specified. MCCD will have final approval over faceplates to be used.

JACKS

Option 1:
Jacks shall be Leviton Infotap Quad 106 (USOC wiring scheme, 110 termination) or equivalent. Use of any equivalent jack must authorized by the District Telecom Coordinator. Jacks shall be numbered in sequence with a permanent material starting with the arabic numeral "1." These numbers will be located both on the faceplate and on the jack itself. The wiring diagram in Appendix A shall be precisely complied with.

Option 2:
Jacks shall be two duplex RJ-45 assemblies mounted horizontally in the outlet box. The top jack shall be an AT&T 106 BFD assembly or equivalent. The bottom jack shall be an AT&T 106 AFD assembly or equivalent.

Wiring
There shall be at least two (2) FOUR-PAIR twisted-pair 24-gauge wires to each jack with standard telco color code (blue/white, orange/white, green/white, brown/white), and wired in a standard telco RJ-11 configuration. The "VOICE" RJ-45 shall support voice, data, or integrated voice and data services: also standard, electronic, or digital sets, and control functions as required by the telephone system. This wiring shall be two (2) pairs of twisted-pair wiring. Voice cable pairs will be terminated on separate, individual 66 type connector blocks from the data cable pairs in each IDF. All voice pairs will then cross-connect to the building riser cable connector block located in the same closet, and will be extended to the main distribution frame. The other three RJ-45s will be wired with two (2) pairs of twisted-pair wiring each.

This wire will run from the outlet to the appropriate floor intermediate distribution frame, terminated on "DATA 66" type connector blocks and cross-connected to the building riser cable connector block located in the same closet and will be extended to the main distribution frame. The wiring diagram in Appendix A of this document shall be followed exactly.

VOICE-ONLY AND DATA-ONLY OUTLETS

Outlet Boxes
Contractor shall install a standard 4" sq. x 2-1/8" D box with appropriate ring at each voice-only or data-only location, with a 3/4" conduit stubbed up 6" above accessible ceiling space. Where ceiling space is not accessible, route conduit back to distribution

space (IDF/MDF). This box shall be at a height consistent with all other outlet boxes in the area unless otherwise specified.

Jacks

Each voice-only jack shall be an AT&T 105AF assembly, and each data-only jack shall be an AT&T 106AF assembly. Use of any equivalent jack must be authorized by the District Telecom Coordinator. Jacks shall be numbered in sequence with a permanent material starting with the arabic numeral "1." These numbers will be located both on the faceplate and on the jack itself. The wiring diagram in Appendix A shall be precisely complied with.

Wiring

One four (4) pair station wire terminating in an RJ-45 jack. The wire shall be run from the outlet to the appropriate floor intermediate distribution frame and terminated on the appropriate 66 type blocks (Voice or Data), then cross-connected to the building riser cable and extended to the main distribution frame.

WIRE ROUTING TO TELEPHONE MOUNTING BOARD

Wires shall be routed to the Telephone Mounting Board in accordance with all applicable building codes. No station run shall be longer than 150 feet.

The wires shall be terminated at the TMB on telco standard "66-type" blocks. Separate blocks will be maintained for wires from the Voice or "A" side and the Data or "B" side. In an existing facility, patterns and documentation shall be followed according to existing facilities. In a new building, A- and B-blocks shall be installed side-by-side, where jack 1 terminates at the same place on the A-block as the B-block. Each A and B termination shall be labeled with the correct jack number on both blocks.

DOCUMENTATION

Written documentation shall be provided for all installed communications outlets. A to-scale floor plan with jack locations indicated by triangles, and assigned number will be provided, along with any cross-connect information to existing cable plant. In the case of an existing facility, new jack documentation will be added to the existing documentation.

INTRABUILDING CABLE

On new buildings or substantially remodeled buildings, vendors must provide enough wiring to meet the immediate requirements listed by the college and provide for at least 30% spare capacity to each equipment closet. In addition, at least 25% of the wiring to the "B" jack must be run from the nearest equipment closet back to the Main Distribution Frame (MDF) from each building on campus.

PREAPPROVAL OF ROUTINGS/DESIGNS

Proposed "as-built" cable placement and routing drawings shall be submitted and approved by the college and the district telecommunications department prior to the start of any work.

WORKMANSHIP AND APPEARANCE

Workmanship quality and neatness of appearance shall be as important as the electrical and mechanical efficiency of the cable plant.

TERMINAL OUTLETS

Specifications for telecommunications terminal outlets are as follows:

1. Outlet boxes must be made of zinc-coated or cadmium plated sheet steel. Boxes shall be one piece stamped sheet steal; spot welding or riveting shall not be permitted. Outlet boxes in finished ceiling or walls shall be fitted with appropriate covers, set to come flush with the finished surface. Sectional switch boxes or utility boxes will be permitted where raceways are fished or otherwise concealed.
2. "Back-to-back" outlets in the same wall or "thru-wall" type boxes will not be permitted. An 8" (minimum) long nipple must be used to offset all outlets shown on opposite sides of a common wall to minimize sound transmission.
3. Unless specified by the college/center, outlets shall be located as listed below. Dimensions given are from finished floor to center line of outlets except panels. Adjust heights of outlets in masonry walls as indicated below; ensure that outlet boxes are set in corner of block or brick and align with the mortar joints. Outlet height shall be consistent in one direction.
    a. Standard Telecommunications Outlets shall be at a height to match electrical outlets in the room
    b. Wall mounted Telecommunications Outlets shall be 48" for wheelchair access

DEVICE PLATES

Device plates for Telecommunications Outlets should match electrical plates in the room.

STANDARD D: DISTRIBUTION SYSTEM REQUIREMENTS

For the purpose of this document, the term "distribution system" refers exclusively to the twisted-pair, copper conductor cable network. The major purpose of the distribution system is to interconnect station instruments and other terminal devices to the line cards of the switching systems (i.e., voice and data). It specifically does not include similar or other types of transmission facilities - cable or otherwise - that might be provided as transmission media between the centralized element (main node) and the distributed elements (remote nodes) of a switching system. Major elements of the distribution system include the following.

1. The standard exchange-type telephone cable itself which is defined as paired, multiconductor, thermoplastic-insulated, copper cable characterized by a mutual capacitance at 1000 Hz of 0.083 microfarad per mile.
2. Terminating hardware which typically includes the following: a distributing frame to interface the distribution network to the line side of the switch; distribution terminals to interface the distribution network to the station instruments and other terminal devices; and, intermediate cross-connect terminals in between to interface one segment of the distribution network to another.
3. Associated structures to support or house the cable: such as building-entry conduit, building conduit, pull-boxes, handholds, major underground conduit structures, and subsidiary conduit installed in association with direct buried cable for street crossings, etc.
4. Sufficient floor space, accessible to outside or corridors (interior), must be provided in each building suitable to house terminal boards (IDF/MDF), racks, cabinets, patch panels, or other miscellaneous distribution equipment.

CABLE SPECIFICATIONS AND DESIGN REQUIREMENTS

The following standards for cable specifications and design requirements shall be observed.

1. All cable provided must be standard exchange-type telephone cable as defined in the section on voice/data standards for twisted pair.
2. Only 24 or 22 AWG Level 3 cable may be used in the distribution network. Selection of wire gauge must be as follows:
   a. Intrabuilding cable must be 24 AWG Level 3, and must meet all electrical code requirements.
   b. Interbuilding cable must be selected based on standard resistance design procedures, taking into account the signalling limits of the switching equipment. Loop resistance calculations shall be based on cable temp erasures of 68 degrees F.
3. Cable must be selected in accordance with the following selection chart.

Application	Conductor	Core	Sheath
Intrabuilding Cable (Vertical Riser)	Solid or Foam/Skin	Air	Alpeth or Alvyn
Intrabuilding Cable (Horizontal Cabling)	Solid	Air	Alpeth
Distributing Frame Terminating Stubs	Solid	Air	Alvyn
Interbuilding Cable (In Conduit)	Foam/Skin	Filled	ASP
Interbuilding Cable (Steam Tunnel)	Foam/Skin	Filled	Alpeth

4. Station wiring shall be uniform throughout the system except where specifically noted.
5. Station device power must be provided from the local distribution closet, the building distribution frame or switching system. All exceptions to this specification require prior approval by MCCD. Station wire must be run from each station jack to its associated local distribution closet, and from there must cross-connect to the building distribution frame. Unless otherwise approved, there must be at least one intermediate distribution frame per floor in each building.
6. Sufficient cable pairs must be run from the building distribution frame to the system main distribution frame (or the appropriate system node distribution frame) to support all wired voice, data and control functions on the outlet for all jacks. No building entrance cable will be less than 25 pair, unless otherwise approved.

DISTRIBUTING FRAME REQUIREMENTS

The following distributing frame requirements shall be observed.

1. Distributing frames must be metallic, preferably single-sided and equipped with "high density" connector blocks and terminal blocks. They must be sized to accommodate initial cut-over requirements plus 25% growth.
2. Terminal blocks must be compatible with the distributing frame and connector blocks provided. Blocks of 100-pair each are desirable.
3. Distributing frame(s) must be grounded, by means of an insulated copper ground wire, to a low resistance earth ground, such as copper ground rods or a copper water pipe system. The maximum permissible resistance to ground, including the resistance of the ground wire, is five ohms. The grounding system for the frame(s) must be separate from that provided for the switching equipment.

DISTRIBUTION TERMINAL AND INTERMEDIATE CROSS-CONNECT TERMINAL REQUIREMENTS

The following distribution terminal and intermediate cross-connect terminal requirements shall be observed.

1. Sufficient distribution terminals must be provided and properly located so as to limit station wiring runs to 150 feet maximum. Connecting blocks shall be compact, with quick-connect terminals (66 blocks).

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2. Building entrance terminals must provide carbon protection for all interbuilding cable pairs terminated, and allow for the use of jumper cables to perform cross-connections from the front of the terminal.
3. Building terminals constructed in utility or similar type closets will require protective housings; as well as terminals constructed in work spaces, hallways and other such exposed areas.
4. Building terminals must be of modular construction to facilitate future additions and rearrangements.
5. To conserve wall and floor space, all large building terminals must be frame-mounted as opposed to wall-mounted. A large terminal is defined as one larger than 1200 total pairs terminated. The frame for such terminals must be sized to accommodate 25% growth beyond the number of pairs terminated initially. This requirement refers only to locations where cable is terminated not station wire.
6. Building-mounted distribution terminals, normally mounted against exterior building walls, inside a housing, must provide carbon block station protection, if needed, in addition to terminating facilities for cable pairs and inside station wiring.
7. Buried service wire terminals, used to feed buried service wires, need not provide station protection as such protection is provided at the station end of the service wire.

SPLICING

The following splicing requirements will be observed.

1. All cable splices must be protected from damage at sheath openings by mechanically protecting all conductors utilizing 3M Scotscast Brand Pair Saver 4458 or equivalent which must be approved by MCCD.
2. All cable shall be thoroughly cleaned and scuffed in an appropriate manner to insure a good mechanical bond when splicing or pressure blocking. Scotscast Brand #4435 nonconductive aluminum oxide abrasive strip, or MCCD approved equivalent, shall be used. All cable, filled or nonfilled, shall be thoroughly cleaned with a nontoxic, environmentally safe solvent, 3M Scotscast Brand 4414, 4415 or MCCD approved equivalent.
3. All splice closures for use on direct burial or underground nonpressurized systems shall be manufactured of clear self-extinguishing, cylindrical two piece tongue and groove fitting P.V.C. Spacer webbing shall be permanently adhered to the inside of the closure to maintain minimum compound fill. End caps must be tapered and flexible and be capable of separate cable entries. Rigid bonding and strain relief bar(s) must be an integral part of the finished closure. Nonenterable polyurethane compound shall be used unless otherwise specified. Reenterable polyurethane compound may be used when specified. 3M Brand Better Brand Gella 4411 (reenterable) or MCCD approved equivalents shall be used as appropriate.
4. All vacant or cable filled ducts shall be sealed with an 8 to 1 ratio expandable urethane foam, 3 M Scotscast 4416 or MCCD approved equivalent.
5. All cable splices shall be supported by a minimum of two cable hooks. Where vertical racking is not present, horizontal racking for support may be used utilizing 3M Brand RC-100 rack adapters or MCCD approved equivalent.
6. Underground cable splicing shall utilize 3M-MS2 4000 series supermini modular connectors. This will include use of "sealant boxes" (type 4075-S or 4076-S) for

added moisture protection. This modular splicing will be used in the underground portions of the project. Vendor shall mark or tag the cable pair count spliced on the cable splicing housing.

7. Splicing of cross-connect terminals (and secondary cable access stubs) not in line or straight splice of diminish/taper splice locations shall utilize Scotchlok - ULG splicing connectors or MCCD approved equivalent.
8. 3M splicing closures or MCCD approved equivalent will be used for splicing throughout the cable system.
9. MS2 Modular Connectors will be installed with cable on the outside plant side of the Main Distribution Frame. The outside plant shall be spliced to incoming cables by the vendor utilizing splicing procedures detailed above.

ASSOCIATED STRUCTURES

The following requirements for associated structures, conduits and pull-boxes shall be observed.

Conduits

1. All conduit runs less than 100 feet from point-to-point shall not contain more than two 90 degree standard factory bends or three 90 degree 24 inch radius bends.
2. All conduit exceeding 100 feet from point-to-point or exceeding two 90 degree bends shall contain accessible pull boxes.
3. Conduit runs shall not contain square or oval conduit fittings.
4. All feeder conduits to telephone terminal cabinets shall enter top or bottom on the extreme right or left side of the box.
5. Intrabuilding conduit guidelines are as follows:
    a. 1" conduit shall be placed for every telecommunications outlet
    b. 1" conduit shall be placed for every video outlet
    c. There shall be one (1) telecommunications outlet for every workstation, every conference room and every classroom with special purpose rooms (i.e. teleconference rooms) having additional outlets added as specified by the college/center.
    d. There shall be three (3) video outlets for every classroom and a minimum of two (2) video outlets for every conference room with special purpose rooms having additional outlets as specified by the college/center.
6. Vendor shall provide 3/32" O.D., 200 lbs. strength polyethylene pull lines in all conduits with less than 50% fill ratio.

Pull-boxes

Pull-boxes shall be provided in accessible positions. Screw covers shall be provided and the box shall be labeled "telephone." Pull-boxes shall have the following sizes:

a. 6" x 6" x 12" for 3/4" conduit runs
b. 4" x 4" x 36" for 1" through 2 1/2" conduit runs
c. 6" x 6" x 26" for 3" and larger conduit runs.

Cable Tray

Cable tray shall be used for all "station" wiring where ceilings are accessible. Cable shall be routed via conduit at each outlet to ceiling space and across to tray. Tray(s) will be located above corridors for easy access after occupancy.

1. All cable trays will be provided by Division 16. Where conduit is not required, the cabling is to be run in cable tray down hallways and through "open rings" to the wall outlet. The open rings should be suspended as close as possible to within one (1) foot of a suspended ceiling. Also, the rings are to be directly fastened to concrete ceiling structure on a maximum of five (5) feet centers. Wire routing shall be parallel and perpendicular to the wire-way and building lines.
2. Cable that is run through the open rings shall be secured to a carrier wire. Sagging will not exceed 3-inches; also, bending of the supporting ring structure will not be allowed. The rings used shall not exceed 60% fill.

STANDARD E: PIN OUTS/CONNECTORS/TERMINATION DEVICES

Pin outs for data adapters, punch block, and terminal servers are included in Appendix B of this document. More detailed information may be obtained by contacting the Manager of Repair Services at the Maricopa Community College District Office.

STANDARD F: COAXIAL CABLE-BASED BROADBAND

The coaxial cable-based broadband network must be identified with the following characteristics.

GENERAL SYSTEM SPECIFICATIONS

1. Broadband networks shall be mid-split type systems capable of distributing VHF television carriers from 5 to 400 MHz or more, T1 carriers, and pilot carriers.

2. The broadband system shall be designed for Automatic Slope/Level Control operation.

3. The system headend will be located at the Media Center of the campus or facility unless specified otherwise by MCCD. Cabling shall utilize MCCD tunnel systems and separate conduit as specified in this document and/or identified on supporting drawings.

4. Coaxial cable fittings and connectors shall have a characteristic impedance of 75 ohms

5. A maximum of two line extenders will be installed in cascade.

6. Splitting of trunk lines and distribution lines will be permitted. However, trunk and distribution lines shall not be tapped for user connections.

7. Distribution cable shall be utilized to provide tap-offs to individual user locations; such lines shall be connected to a trunk-line cable through high-isolation bridging amplifiers.

8. Built-in test points shall be provided for system maintenance at input and output of trunk amplifiers and distribution amplifiers.

9. All passive devices shall be rated to pass a continuous AC current of ten (10) amperes at 60V AC, except multitaps, which shall be rated to pass a continuous six (6) amperes at 60V AC.

10. The system shall be operational between the range of -40 degrees and +140 degrees, Fahrenheit.

11. The system shall be designed for 200% tapping, based on the location count for building(s) to be served at the time of installation. If this count indicates a requirement for more than eight (8) drops on a distribution line, a directional coupler shall be installed with an output 10dB higher than the minimum multitap specified.

12. System shall meet all applicable FCC regulations in effect at the time of construction or modification.

ACTIVE EQUIPMENT SPECIFICATIONS

1. All circuitry in active equipment shall be fully constructed with solid state devices. Fuses or circuit breakers shall be provided for protection of the equipment from damage due to overload.

2. All equipment shall be remotely powered through the coaxial cable by means of regulated transformers. Also, all equipment shall be designed to allow only alternating current to flow in the coaxial cable. A suitable RF power line filter shall provide not less than 46 dB of RF attenuation on the AC path. Circuit breakers shall be provided in all devices that are to be connected to the power source.

3. All system trunk amplifiers shall operate with uniform output levels, except as affected by temperature and peak-to-valley specifications.

4. No more than 40 dB of trunk cable shall exist between active devices without containing both Automatic Level and Slope Control.

5. System shall be equipped with redundant power supplies at the headend location.

CABLE SPECIFICATIONS

1. All coaxial cables used in the system shall have a nominal characteristic impedance of 75 +/- 2 ohms over the entire specified frequency range, except as noted below.

2. All trunk and distribution cables in the system shall be tested on the site for return loss and attenuation.

3. All trunk lines shall use .750" aluminum cable. Distribution lines shall use .500" aluminum cable.

4. All intrabuilding trunk and distribution cables in the system shall have an aluminum outer conductor, foam polyethylene dielectric, and copper-clad center conductor.

5. All interbuilding trunk and feeder cables in the system, within conduit, shall have an outer black jacket of polyethylene (.040" min.), aluminum sheath outer conductor with a flooding compound between the jacket and aluminum sheath, foam polyethylene dielectric, and copper-clad center conductor.

6. All direct buried trunk and distribution cables in the system shall have a black outer jacket of polyethylene (.040" min.), steel armor protective shield, black polyethylene inner jacket (.040" min.), aluminum sheath conductor with flooding compound between the inner jacket and the aluminum sheath, foam dielectric, and copper-clad center conductor.

7. Drop lines from the taps to each user outlet shall use quad-shielded FEP-jacketed, RG-6 type cable with foamed polyethylene dielectric. All RF ports shall be terminated with 75ohm resistors.

8. Attenuation shall be based on the manufacturer's maximum rated loss in dB per 100 feet at 50 and 400 Mhz, at a stabilized ambient temperature of 60 degrees, Fahrenheit, corrected to 110 degrees, Fahrenheit, for system layout design.

CABLE TESTING

1. Cable frequency sweep or time domain reflectometer testing shall be performed on all trunk and distribution cables after installation in order to detect any cable defects or damage caused during installation. The cable structural return loss shall be better than 30 db.

SYSTEM PERFORMANCE SPECIFICATIONS

1. True structural return loss shall be 30 dB minimum from 5 to 400 MHz.

2. Trunk Cables shall meet the following specifications for performance between any two (2) self-contained points of the trunk transportation systems with carriage of 35 VHF channels.

   a. Gain Versus Frequency Response (peak-to-valley) within the respective pass band, shall be no greater than O.5 dB across any 6 MHz segment.

   b. Maximum overall excursion from ideal Gain Versus Frequency Response (50 to 400 MHz) at any trunk amplifier station shall not exceed N/10 + 1 dB.

   c. The Carrier-to-Noise within a 4 MHz bandwidth at 85 ohms shall be (59-10 logN) or better.

   d. The Carrier-to-Hum Ratio shall be (70-20 logN) or better.

   e. Carrier-to-Cross Modulation shall be (85-20 logN) or better.

   f. Carrier-to-Second Order Ratio A-B singular discrete component shall be equal to or better than (85-10 logN) for cascades 10 amplifiers or less.

   g. Carrier-to-Composite Triple Beat Ratio shall be measured with system fully loaded with at least 40 channels and shall be (82-20 logN).

   h. Trunk operating levels shall not vary more than +/-1.5 dB over the temperature range 0-100 degrees Fahrenheit, and +/-2.75 dB over the temperature range -40 to +140 degrees, Fahrenheit.

3. For systems up to and including twenty trunk amplifiers, bridger and two line extenders, the combined forward trunk and distribution system will deliver signals at each user port that will meet or exceed the following specifications over the temperature range of 0-100 degrees Fahrenheit, unless otherwise indicated.

   a. Peak-to-Valley (any 6-Mhz video channel) 0.75 dB

   b. Peak-to-Valley, 50-400 MHz +/-(N/10 + 2.5)

c. Carrier-to-Noise (4 MHz bandwidth) 45 dB

d. Carrier-to-Hum (includes PS switching frequency) 43 dB

e. Carrier-to-X-Mod (NCTA STD 0267, 54 channels) 51 dB

f. Carrier-to-Second Order (Single), 63 dB

g. Carrier-to-Composite Triple Beat, 49 dB

h. Carrier-to-Echo Ratio (greater than 2 microsecond displacement), 40 dB

i. Differential Gain, 0.5 dB

j. Differential Phase, 1 degree

k. Differential Group Delay ~ 58.83 MHz, 18.5 N sec. 1 as referenced to 55.25 MHz, 17.5 N sec. 2

l. Minimum Visual Carrier Level, Ch. W (55 degrees Fahrenheit), +10 dBmV 3 ; Maximum , +15 dBmV 3

m. Minimum Visual Carrier Level, Ch. 2 (55 degrees Fahrenheit), +4 dBmV 3; Maximum (6 dB variance from W)

n. Maximum Visual Carrier Level Change from 0-100 degrees, Fahrenheit, 3.0 dB

o. Isolation between User locations, 36 dB 4

RETURN DISTRIBUTION

The following specifications are expected performance (except as modified by Peak-to-Valley Specifications) between any two self-contained points in each transportation system. The operational output levels, with bi-directional capabilities utilized (carriage of 3 return VHF channels), are at 55 degrees, Fahrenheit (except where indicated otherwise) and are based on 50' RG 6/U Drop Cables.

1. The Gain Versus Frequency response within the respective pass band shall be no greater than 0.75 dB.

2. When measured at the last balance temperature, the Frequency Response at any and all amplifier stations will not exceed N/10 + 1 dB, 6-30 MHz.

3. The Carrier-to-Noise ratio within a 4 MHz bandwidth at 75 ohms shall be (67-10 logN+), where N+ is the total number of return distribution amplifiers converging at any trunk station.

4. The Carrier-to-Hum ratio shall be 1.0% or better.

5. The Carrier-to-Cross Modulation ratio shall be (98 - 20 log N) or better.

6. The Carrier-to-Second Order ratio (A-B) singular discrete component shall be (75 - 10 log N).

7. Operating levels shall not vary more than (.0012 x dB of cable x degrees Fahrenheit of temperature change), or more than 2.0 dB from those levels achieved at balance, as measured at the output of any AGC station over the temperature range of 0-100 degrees, Fahrenheit. Should the ambient temperature exceed these limitations, the levels will not vary more than an additional 2.0 dB.

8. Chroma delay, carrier plus 3.58 MHz "relative," shall not exceed (N x 10 nsec) for a TV channel whose visual carrier is 19 Mhz.

SYSTEM ALIGNMENT

1. Upon completion of the system installation, it shall be the responsibility of the Contractor to perform all necessary alignments to insure proper system operation.

2. The forward path shall be aligned utilizing a sweep or variable signal generator located at the headend and a spectrum analyzer or a field strength meter at each trunk amplifier output and at the midpoint of the longest distribution branch for each distribution amplifier. Each trunk amplifier will be adjusted for flat output at the forward output test point; and, and each distribution amplifier will be adjusted for flat output at the midpoint. Thus, each forward trunk amplifier compensates for the slope of the cable that precedes it and each forward distribution amplifier compensates for the slope of the cable that precedes it as well as one-half of the cable that follows it. Amplifier output levels shall be as specified (under System Performance) when TV visual carriers of 56 dBmV are injected into the headend combiner ports. The input levels may vary +/- 2 dB because of tolerance build-up.

3. The reverse path shall be aligned utilizing a sweep or variable signal generator located at the midpoint of the longest distribution branch for each distribution amplifier. Each distribution return amplifier will be adjusted to obtain flat input at the specified level into the following trunk return amplifier when TV visual carriers of 56 dBmV are injected into the midpoint. Also, each trunk return amplifier will be adjusted to obtain a flat input, at the specified level, into the following trunk return amplifier or out of the headend return splitter ports. The output levels may vary +/- 2 dB because of tolerance build-up. Thus, each distribution return amplifier compensates for the cable that follows it, as well as one-half of the cable that precedes it in the return direction; and, each trunk return amplifier compensates for the slope of the cable that follows it in the return direction.

PROOF OF PERFORMANCE

1. Before the Contract can be considered complete, the Contractor shall conduct a Proof-of-Performance test to demonstrate the system's ability to operate within the requirements of these specifications. Testing shall be performed in the presence

of MCCD Project Manager or designee. One week advance notification is required by the Project Manager.

Additionally, the Contractor will furnish all equipment and personnel to collect, compile, and edit the required test data into a written report as described below. In the case of a new system installation, or extensive modification to an existing system, the Contractor shall submit a final Test Plan to MCCD for approval at least 30 days before the final testing is to begin.

2. On-site measurements for each segment will be conducted and recorded at two test sites. One of the test sites shall represent the longest system cascade and the other may be designated by the MCCD Project Manager or designee. The system shall be tested for the following: a. Visual carrier frequencies
   b. Aural carrier frequencies
   c. Visual carrier levels
   d. Aural carrier levels
   e. TV and related frequency spectrum flatness
   f. Low frequency disturbances
   g. In-channel frequency response
   h. System S/N ratio
   i. System co-channel interference levels
   j. Intermodulation and spurious signal levels
   k. User port isolation
   l. Cable and equipment radiation levels
   m. Any other measurements required by FCC Technical Standards, Part 76.

3. The following shall also be included in the test data.
   a. Forward and return input and output levels at each amplifier and stand-alone equalizer
   b. Forward sweep response at each trunk amplifier output and at mid-span for each distribution amplifier
   c. Return sweep responses at each trunk amplifier input from each branch feeding each trunk amplifier
   d. Additional supportive documentation will be appendixed in the following form: Detailed list of test equipment used which will include nomenclature, model, serial number, and last date of calibration.
   e. Detailed block diagrams for each measurement procedure, with verbal description of measurement technique
   f. Name of personnel who performed the tests
   g. Formulas, charts, etc., used to compile data into standard format

Upon completion of on-site test measurements, all collected data shall be compiled and edited by the Contractor into a report which details system performance. Three copies of the final report will be submitted to the MCCD Project Manager. MCCD reserves the right to contract a third party of its own choosing to verify any or all Proof-of-Performance results.

PHYSICAL INSTALLATION

1. All equipment shall be installed in a neat manner and to the complete satisfaction of the MCCD representative. All equipment installation and wiring shall conform to the National Electrical Code, applicable local codes, and the practices of the National Cable Television Association.

2. All equipment power wiring and grounding shall conform to the National Electrical Code and applicable local codes. Electronic equipment, racks, amplifiers, power supplies, antennas, and towers shall be grounded using a No. 6 solid copper wire.

3. Cable shall be adequately supported at least every 5 feet; connectors shall be suitable for the cable specified. Cable supports must not cause crushing or distortion of the cable nor cause bends less than the minimum permitted for each type cable as specified by the cable manufacturer.

4. Physical separation between input and output cables shall be maintained within racks and terminal cans. Each cable shall be labeled at the device to which the cable attaches as to input and output and by runs, as indicated by drawings.

5. All penetrations through fire walls and all vertical penetrations through floors shall be treated to maintain compliance with applicable fire codes.

6. All trunk, distribution, and drop cabling through offices, administrative areas, and classrooms shall be concealed in trays or raceway appropriate to the space. Directional coupler and tap housings shall be concealed in metal boxes sized sufficiently to allow for acceptable cable bending radii.

7. Wherever possible, all exposed 1/2 and 3/4 inch cable shall be at least 8'-6" above the floor. All drop cable that is required to be in wiremold shall be placed in the wiremold from 8' above the floor, or from the false ceiling, if one exists, down to the termination. Terminations shall be at the same height above the floor as existing electrical outlets in each room.

8. All cabling shall be routed to prevent interference with any existing systems such as access boxes, ventilation mixing boxes, access hatches to air filters, switch panels, fire alarm equipment, clock systems, lighting fixtures, etc. The Contractor will be responsible for re-routing any cabling that is not acceptable to MCCD, at no cost to MCCD.

9. All equipment shall be suitably mounted in cabinets, closets or tunnels. Equipment suspended by its coaxial cable or connector is not acceptable. Shop drawings of proposed mounting of equipment will be submitted for approval by MCCD.

10. The recommended method of mounting amplifier housing is to securely mount a plywood backboard on the wall. Then fasten two metal D-rings to the plywood and mount the amplifier housing to the D-rings using clamps supplied with the housing. Securely mounting the D-rings directly to the wall is acceptable if permitted by the wall construction. Whenever possible, the amplifier shall be

mounted so that the lid hinges downward to provide access to the interior. In all cases choose a mounting location that will permit the lid to be fully opened without interference from any other structures.

11. All taps must be mounted in order to provide easy, direct access to the tap ports. Splitters and taps located in ceiling spaces, trays, or raceways shall be securely attached to the adjoining structure such as the ceiling support wire or tray edge.

12. Splitters or taps shall not be solely supported by the cable. The cable should also be supported within three feet on either side of the splitter, tap, or amplifier.

13. All outdoor and underground tunnel or conduit connections and splices shall be weatherproofed through the use of shrink tubing with precoated sealant or other approved methods. Directly buried cabling shall be of self-sealing compound with armor. Underground cable in tunnels and conduits shall be of self-sealing compound as specified.

14. Splices shall be kept to a minimum and only permitted where specified or when installation around existing structures/equipment is not reasonably possible without splicing.

15. User ports shall be at the same height as existing electrical outlets in each room unless directed otherwise by MCCD. Flush mounted outlets shall be installed to blend with existing outlets. Drop cabling shall not be subjected to sharp edges during installation through wall or ceiling structures. Installation of cable around removable devices, instruments, sub panels, etc., shall be provided with adequate support, length, protection, and flexibility to ensure cable is not disturbed when the unit is removed.

16. All interior drop cabling, CAB-6 flexible cable, will be routed in the most efficient manner to ensure minimum length and neat appearance.

17. Drop cable corridor crossings shall be attached to building structure, run in conduit, or run in wiremold where exposed. Crossings shall be in wiremold where trunk/distribution cable is indicated to be in tray or wiremold.

18. When the drop cable is run parallel to trunk/distribution cable, it shall be attached to the trunk/distribution cable at least every 30".

19. Drop cable that must be surface mounted shall be inside of conduit, raceway, or wiremold to protect it from damage.

20. Trunk and distribution feeds within buildings shall be installed above the false acoustic tile ceilings in accordance with the National Electrical Code whenever possible, otherwise shall be installed in conduit, wiremold, or cable tray.

21. Percussive drilling is NOT permitted, only core or rotary drilling which results in clean, sharp holes is allowed.

22. Exposed 1/2 inch cable shall be supported at least every 5 feet.

23. Service loops (6" minimum) will be provided at each device to allow for thermal expansion and contraction and to allow for possible replacement of the device.

26. Any cable that is required to be installed in air plenum spaces shall meet NEC 725-2(b) requirements, and be approved for use in air plenums without conduit, or else the cable shall be installed in conduit.

27. Any part of the system (installation or equipment) not meeting the requirements of this specification shall be corrected at no cost to MCCD.

RECOMMENDED GUIDELINES
GUIDELINE A: ENGINEERING/ENVIRONMENTAL CONSIDERATIONS

Design of a reliable, energy efficient, and safe data center facility requires careful planning in two general areas: "general considerations" and "essential elements." General considerations deal with all aspects of site selection and planning, and environmental considerations. Essential elements include electrical considerations, grounding, electromagnetic interference, temperature and humidity, and airborne contamination. This section provides requirements for each of the two areas, and refers you to documents where detailed information on each consideration may be obtained.

GENERAL CONSIDERATIONS

General considerations include site selection, site planning, and environmental considerations. Site selection planning, whether for a new or existing building, deals with space and location considerations. Site planning considers flooring, fire and safety, security, lighting, acoustics and other considerations. Environmental considerations include access flooring, static loading, fire suppression systems, and environmental products. A fire prevention plan must protect the facility from fire and high temperatures. The plan should employ a fire protection system which includes sensitive and immediate-response detectors, accessible controls, and a fire extinguishing agent (halon 1301). Information on these and other topics, which must be considered for a successful site selection and preparation, can be found in **Chapter 1 of the Computer Facilities Design Guide**.

A well designed and cost-effective security system should be implemented to protect the facility. Security systems can be configured to provide controlled access to facilities by authorized personnel, to monitor strategic areas, and in general, to protect confidentiality and to discourage unauthorized use of resources. Since there are many types of security systems, factors such as budget, convenience, and the desired level of protection should be considered. Security systems range from simple entry keys to sophisticated card-entry systems supplemented by closed-circuit television monitoring systems. Card key systems can provide controlled access to areas, along with audit information for each access station. More detailed information on security considerations can be found in **Chapter 1** of the **Computer Facilities Design Guide**, and the **SECURITY SYSTEMS** guideline section in this document (**GUIDELINE: SECURITY SYSTEMS**).

ESSENTIAL ELEMENTS

Elements which are essential to the design of a computer facility include electrical and grounding, electromagnetic interference, temperature and humidity, and airborne contamination. The electrical and grounding phase is one of the most important of the design project. Adequate, properly grounded, and reliable power is crucial to the successful operation of any data center. Commercial power distributed to your building is not always within acceptable standards. A number of steps can be taken to alleviate this problem. First, a dedicated power source with an isolated ground should be considered. A power distribution/conditioning system is also recommended. It should be remembered that all electrical and grounding specifications must meet the National Electrical Code Standards. **Chapters II and III of the Computer Facilities Design Guide** provide considerable reference material in these two areas.

Control of electromagnetic interference (EMI) and static electricity are essential to a smoothly operating computer facility. EMI sources must be identified and controlled. Proper dissipation of static electricity is essential to avoid damage to equipment. Detailed information on EMI and static electricity can be found in **Chapter IV** of the **Computer Facilities Design Guide**.

Finally, a properly designed facility must include plans for temperature, humidity, and airborne contamination control. It must be capable of operating 24 hours per day, 365 days per year, while maintaining precision temperature control at 72 degrees, and a constant 45% humidity level. More detailed information on these considerations can be found in **Chapters V and VI** of the **Computer Facilities Design Guide**.

In summary, information on the following considerations can be found in the indicated chapters of the **Computer Facilities Design Guide**.

Chapter 1: General Considerations
Chapter 2: Electrical Considerations
Chapter 3: Grounding
Chapter 4: Electromagnetic Interference
Chapter 5: Temperature and Humidity
Chapter 6: Airborne Contamination

GUIDELINE B: T1/DS1 MICROWAVE NETWORK

****** to be completed ******

GUIDELINE C: RELATIONSHIP OF VOICE-DATA-VIDEO COMMUNICATIONS TO ELECTRICAL ENVIRONMENT

Guidelines explained in this section are intended to establish the physical relationship between voice-data-video (VDV) cabling and electrical power cabling for both external cabling and internal cabling.

EXTERNAL CABLING

The following guidelines shall apply when cabling is being installed offsite, leading to a facility or building.

[] If possible, the VDV cabling and electrical cabling should be installed in separate excavated trenches. However, if the same common trench must be used, then the electrical cabling must be installed at the bottom of the trench and covered by a concrete cap in accordance with the project specifications. The VDV cabling shall be installed at least 24 inches above the electrical cabling in the same trench.

[] The VDV and electrical cabling shall have separate manholes, pull boxes, and junction boxes as they approach and enter the facility or building.

INTERNAL CABLING

The following guidelines shall apply when cabling is installed within a facility or building.

[] The VDV and electrical cabling shall be installed in separate conduits whenever conduits are required by the project specifications.

[] In the rare case where the VDV and electrical cabling must run in the same raceway, the VDV and electrical cabling must be kept separate by a physical barrier which is color coded in such a way to indicate the difference in the two types of cabling.

GUIDELINE D: SECURITY SYSTEMS

The Maricopa Community Colleges currently do not have sufficient experience with security systems to establish standards. Several colleges have installed various types of security systems but no two systems are the same. The evaluation of protective features provided by a security system must take into account the cost of such features in comparison to the property value which the security system will protect. Not all areas of a facility need be protected by a security system. Instead, security protection should be considered only for those areas which can cost justify the protection.

Security protection systems vary depending on whether items (computer equipment, books, computer disks, etc.) or spaces (rooms, halls, offices, etc.) are to be protected. Other types of security protection systems control personnel access to areas where hardware, software, or information are kept.

The following outline addresses areas and levels of control. It is intended as a reference guide to show types of protective features to be considered when planning for a security system. The outline is organized by type of protection to be addressed (space versus access control, etc.).

- A. Perimeter control
  - 1. Card reader
    - a. Reader only
    - b. Reader with keypad
  - 2. Door contacts
- B. Access (room) control
  - 1. Card reader
    - a. Reader only
      - 1) Ability to cancel user's access
      - 2) Identification of users accessing area
    - b. Reader with keypad requiring entry of personal identification number (PIN)
      - [] Eliminates use of card if lost
    - c. Card access system
      - 1) Complete system including card readers, microcomputer, security management software, printer, card encoder, and distributed processing modules
      - 2) Vendor
        - [] Kidde Automated Systems
  - 2. Fingerprint reader
    - a. Requires "personal" identification of user
    - b. Eliminates security compromise due to loss of security card and/or compromise of PIN
    - c. Potential vendors
      - [] Fingermatrix, Inc.
- C. Space (room, hall, etc.) protection
  - 1. Passive infrared
    - [] Ceiling or wall-mounted circuit designed to detect movement
  - 2. Glass breakage detector

      Ceiling or wall-mounted audio discriminator circuit designed to detect common sound of shattering glass

3. Video monitoring
    a. Time-lapse video recorder
        1) Provides 24-hour recording of area(s) being monitored
        2) Vendor
            [] Panasonic
4. Digital video compressor
    a. Combines multiple (up to four) cameras into one video signal for displaying, transmission, or recording
    b. Vendor
        [] Robot Research, Inc.
5. Noise monitoring
6. Relationship between card reader for access and card reader for space protection
    [] May require use of two separate card readers 1) to grant access through door, and
        2) to deactivate infrared or sound detectors in a room

D. Item (computer, disk, book, etc.) control
1. Rf-based system
    a. Non-magnetic system which can be used with magnetic media without rising loss of data/information
    b. Rf detectors (sensing antennae) placed at entry\exit point(s)
    c. Size of detection tags permits placement on small items, such as 3.5" diskette and cassette tapes
    d. Detection tags can also serve as bar code labels
    e. Vendors
        [] Check/point Systems, Inc.

E. Data access
1. Fingerprint reader offers alternative to passwords for accessing computer files, servers, etc.
2. Vendors
    [] Fingermatrix, Inc.

F. Uninterruptible power system for security systems
[] Recommended for any security system to ensure that a power failure will not render the system useless.

GUIDELINE E: ENTRANCE FACILITIES

Entrance facilities are defined as the cabling provided by USWest Communications to connect the on-site interbuilding wiring to the local exchange. Entrance facility size should be based upon an estimate of total voice/data needs anticipated when the college is fully built and equipped. Conduit will be sized accordingly.

Routing of entrance facilities to the MDF will be engineered by USWest Communications for approval by the district telecommunications department.

GUIDELINE F: OUTSIDE PLANT CONDUITS

For the purposes of this document, outside plant is defined as the interbuilding conduit structure and cabling used for voice and data communications (twisted pair), broadband, and Ethernet. The following guidelines should be observed.

UNDERGROUND CABLE

Cable being installed in conduit shall be handled with care and protected from being kinked. A kink is defined, for purposes of this document, as violation of the manufacturer's specified Minimum Bend Radius for each type cable involved. Cable shall not be formed to cause the outside sheath to wrinkle. Unsheathed cable shall not be left exposed to the elements. Cable will be unrolled from the shipping spool and not allowed to spill from the side of the spool.

MANHOLES

The standard size for manholes used with major underground conduit structures of five ducts or more will be 6' wide x 12' long x 7' high; pullboxes with minimum dimensions of 4' wide x 5' long x 4' high may be used instead of manholes for major conduit structures of four ducts or less.

CONDUIT SIZE

Conduits for outside plant cabling will be sized proportionately to the size of the cable required to feed individual buildings. At a minimum, there shall be one (1) 4" conduit for telecommunications wiring (twisted pair), one (1) 4" conduit for video wiring (coaxial cable) one (1) 4" conduit for data communications (Ethernet fiber or coax), and one (1) 4" conduit for spare.

GUIDELINE G: CONDUITS WITHIN BUILDINGS

Conduit structures must be provided for all voice/data/video cabling within buildings. The dual voice/data jack requires three-quarter inch (3/4") conduit. The Video cabling requires one-inch (1") conduit. Additional three-quarter inch (3/4") conduit may be required for data-only and/or LAN jacks. Sizing of conduit should be done in conjunction with the Maricopa Community College District Office Information Technologies Services Department.

GUIDELINE H: PHONENET LANS

This guideline includes PhoneNET LAN specifications along with MCCD recommended hardware. Cable limitations are also cited.

SPECIFICATIONS

Following are PhoneNET specifications:

[] Functional Appletalk compatibility: 100% hardware and 100% software.
[] Topology: parallel bus, low-resistance transformer isolated, floating ground.
[] Signal Standard: EIA modified RE-422, balanced voltage.
[] Signaling Speed: 230, 400 Baud. PhoneNET system is speed independent and can support network signal rates in excess of 1M baud.
[] Signal Encoding: FMO (bi-phase) space.
[] Frame Format: SDLC (Synchronous Data Link Control).
[] Maximum Length: 3000 feet between repeaters or bridges, or per branch on a star controller for Macintosh equivalent devices.
[] Maximum Number of Connections: 32 recommended per logical network (254 address space).
[] Node Identifications: AppleTalk logical address is self-configuring, no user action required.
[] RFI and Noise Immunity: No RFI passive taps, noise immunity greater than 600 volts.

MCCD RECOMMENDED HARDWARE

Following Shiva Corporation hardware is recommended.

[] NetBridge™: Zone-to-Zone Bridge, extends device limits by creating a second zone, does not extend any line length limits.
[] FastPath™: The FastPath hardware connects a LocalTalk or compatible network to a thick or thin Ethernet or compatible network. FastPath gateway program is called K-STAR (Kinetics-Style Addressing and Routing). K-STAR contains software modules which implement AppleTalk Phase 1 and Phase 2 protocols, transition bridge software, TCP/IP protocols (including UDP, ICMP, and RIP), DECnet, and SNMP. The user provides configuration data to the gateway, and downloads the K-STAR gateway program using the FastPath Manager Macintosh application.
[] StarController™: StarController is an active Star hub. It extends the maximum wire length of a network, but does not provide for any device extensions. Also, StarController is a twelve-leg hub with an additional management port. Each leg can be branched into four additional legs.
[] PhoneNET™: PhoneNET adapter is a basic hardware unit which attaches a computer or other device to the network wires. The connector provides necessary signal link for communicating between devices; each device must be configured with a PhoneNET adapter. It should be noted that MCCD Computer Repair stocks quality cost-effective PhoneNET or compatible adapters.

CABLE LIMITATIONS

The following cable length limitations are standard industry guidelines. Maximum cable length is without an active star hub or repeater.

NUMBER OF BRANCHES	LENGTH IN FEET PER BRANCH (22-gauge wire)
1	3,000
2	1,500
3	1,000
4	750

Line limitations may be reduced by number of connections and wire gauge. Modular cable is often 26-gauge, and will double wire consumption. For example, an entirely Modular Daisychained network will need to be less than 1,500 feet, with no more than 20 connectors.

Note: Some network devices, such as the FastPath, have signal output levels that are significantly less than that of a Macintosh. These devices must be located closer to the StarController than a Macintosh. The branch cable connecting these devices may not exceed 1,500 feet. Ensure that the port to which the branch cable is connected has no additional branches connected to it, and that the device is the only one on the branch.

APPENDIX A
WIRING FOR BUILDINGS

WIRING FOR EXISTING BUILDINGS AND BUILDOUTS 106BFD Voice and Data Jacks*	
WIRE	**PIN NUMBER**
White/Blue	1
Blue/White	2
No Connection (N/C)	3
White/Green	4
White/Orange	5
Orange/White	6
Green/White	7
No Connection (N/C)	8
*NOTE that both voice and data jacks are wired identically.	

APPENDIX A
WIRING FOR BUILDINGS
(Continued)

WIRING DIAGRAM FOR NEW BUILDINGS: OPTION 1-VOICE LEVITON InfoTap Quad 106 Jack for VOICE	
WIRE COLOR	**PIN DESIGNATION**
White/Blue	1G
Blue/White	1R
White/Orange	1B
Orange/White	1Y
White/Green	2G
Green/White	2R
White/Brown	2B
Brown/White	2Y

WIRING DIAGRAM FOR NEW BUILDINGS: OPTION 1-DATA LEVITON InfoTap Quad 106 Jack for DATA	
WIRE COLOR	**PIN DESIGNATION**
White/Blue	3G
Blue/White	3R
White/Orange	3B
Orange/White	3Y
White/Green	4G
Green/White	4R
White/Brown	4B
Brown/White	4Y

APPENDIX A
WIRING FOR BUILDINGS
(Continued)

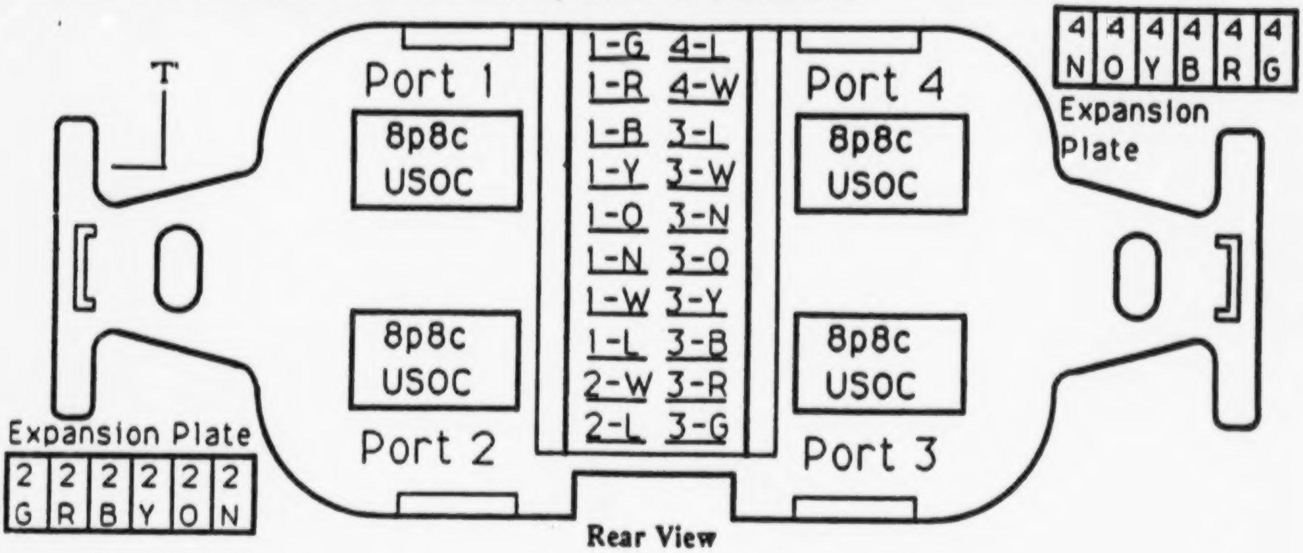
InfoTap^{TM} Quad 106 Wiring Instructions

Jack conductors are wired per the diagram below.

Example: 1-G= green wire of port 1 (top left jack as seen from the rear of the device when device is oriented as in diagram below.) Complete connection by installing insulation displacement caps (provided with 110 connectors) or using appropriate tool (110 or Krone®).

Wire color codes: G=Green; R=Red; L=Blue; O=Orange; B=Black; Y=Yellow; N=Brown; W=White

NOTE: For monument or floor box use, snap-off the 'T's of both ends.



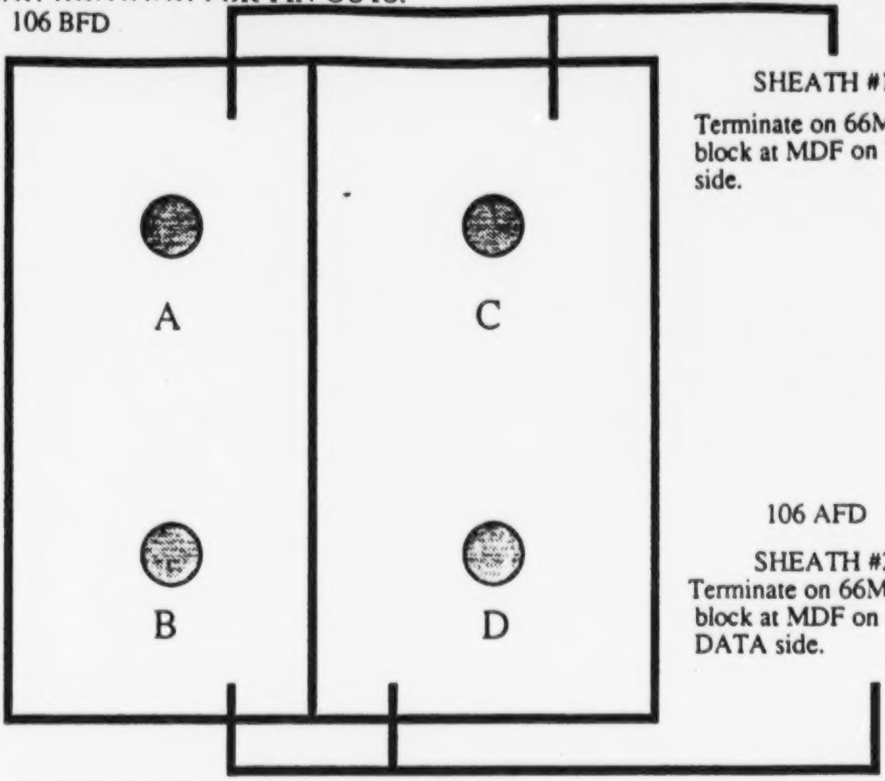
Rear View

APPENDIX A
WIRING FOR BUILDINGS
(Continued)

WIRING FOR NEW BUILDINGS: OPTION 2 - DATA AT&T 106 BFD AND AT&T 106 AFD DUPLEX JACKS

THE FIRST SHEATH OF WIRES WILL TERMINATE ON A AND C. REFER TO THE FOLLOWING DRAWING FOR PIN-OUTS.

106 BFD



SHEATH #1

Terminate on 66MI50 block at MDF on Voice side.

106 AFD

SHEATH #2

Terminate on 66MI50 block at MDF on DATA side.

THE OTHER CABLE WILL TERMINATE ON B AND D

SHEATH #1

JACK A		JACK C	
WHITE/BLUE	PIN 1	WHITE/GREEN	PIN 1
BLUE/WHITE	PIN 2	GREEN/WHITE	PIN 2
WHITE / OR	PIN 5	WHITE/BROWN	PIN 5
OR/ WHITE	PIN 6	BROWN/WHITE	PIN 6

SHEATH #2

JACK B		JACK D	
WHITE/BLUE	PIN 1	WHITE/GREEN	PIN 1
BLUE/WHITE	PIN 2	GREEN/WHITE	PIN 2
WHITE/ORANGE	PIN 5	WHITE/BROWN	PIN 5
ORANGE/WHITE	PIN 6	BROWN/WHITE	PIN 6

APPENDIX B
PIN OUTS/CONNECTORS/TERMINATION DEVICES

DATA ADAPTER CONFIGURATIONS
Macintosh 128, 512
Male DB-9

Signal	DB-9
TXD	5
RXD	9
GND	3
DTR	6

DATA ADAPTER CONFIGURATIONS
Mac Plus, SE, Classic, LC, II, and Quadra
Male Circular Mini DIN-8

Signal	Circular-8
TXD	3
RXD	5
GND	4
DTR	1

DATA ADAPTER CONFIGURATIONS
IBM-IBM Compatibles, Terminals
DB-25, RS-232

Signal	PIN
TXD	2
RXD	3
RTS	4
GND	7
DCD	8
DTR	20

APPENDIX B
PIN OUTS/CONNECTORS/TERMINATION DEVICES
(Continued)

PUNCH BLOCK CONFIGURATION			
Signal	**Punch Down**	**Cross-Connect Color**	**Signal Name**
TXD	1	Red/Blue	Transmit Data
RXD	2	Blue/Red	Receive Data
GND	3	Red/Orange	Ground
DTR	4	Orange/Red	Data Terminal Ready
RI	5-if modem	White/Blue	Ringer
Apple Talk	5-if Apple Talk	White/Red	
DCD	6-if modem	Blue/White	Data Carrier Detect
Apple Talk	6-if Apple Talk	Red/White	

TERMINAL SERVER RSA8 AND RJ11 PIN OUTS			
Signal	**RSA8**	**RJ11**	**Signal Name**
RI	22	1	Ringer
GND	7	2	Signal Ground
TXD	2	3	Transmit Data
RXD	3	4	Receive Data
DTR	20	5	Data Terminal Ready
DCD	8	6	Data Carrier Detect

DATA ADAPTER CONFIGURATION		
1.	Press Data	
2.	Press DTX	
3.	Press 00 (Press zero twice) The configuration options should be displayed. The first option is Error Check.	
4.	To change the settings, enter the desired number and press the #. If the setting is correct, press # for next option. The settings should be as follows.	
	Error Check	01
	Auto Answer	01
	Out-Going Modem	01
	In-Coming Modem	01
	Speed	08
	Parity	00
	Async	00
	Half Duplex	01
	Stop Bits	00
	Code	00
	Profile	00
5.	Upon verifying all settings, press Data to exit.	

APPENDIX C
GLOSSARY

Amplifier - A device which increases the power or amplitude of an electrical signal. Amplifiers are placed where needed in a cable system to strengthen signals weakened by cable and component attenuation. Two-way, single-cable systems use a forward and a reverse amplifier inside one enclosure to boost signals travelling in both directions.

Backbone wiring - The backbone wiring system is also recommended to be topologically arranged in a star configuration whether within a building or across a campus. The topology shall use a maximum of two levels of cross-connects (main and intermediate). Interconnection between two telecommunications closets shall pass through a maximum of three cross-connects (intermediate-main-intermediate). Only a single cross-connect shall be passed through to reach a main cross-connect. Telecommunications closets may be wired directly together.

The cables recognized in the backbone wiring are:
[] 100-ohm UTP cable.
[] 150-ohm STP cable.
[] 50-ohm coaxial cable.
[] 62.5/125 um optical fiber cable.

The distances for the topologies are the same across all media for the telecommunications closet to the intermediate cross-connect, 500 m (1640 ft) maximum. They vary for the distance from the intermediate cross-connect to the main cross-connect due to performance.

Balancing - Adjusting the gains and losses in each path of a system to achieve equal signal levels (usually to within 3dB) at all user outlets. A balanced network also provides near equal input signal levels to the headend from transmitters connected anywhere in the network.

Bandwidth - The frequency range that a component, circuit, or system can pass. For example, voice transmission by telephone requires a bandwidth of about 3000 Hertz (3 kHz). A television channel occupies a bandwidth of 6 million Hertz (6 MXz). Cable systems occupy 5 MHz to 300 or 400 MHz of the electromagnetic spectrum.

Branch - An intermediate cable distribution line in a broadband coaxial network that either feeds or is fed from a main trunk. Also called a feeder.

Cable Loss - The amount of RF signal attenuation by a given coaxial cable. Cable attenuation is mainly a function of signal frequency and cable length. Cables attenuate higher frequency signals more than lower frequency signals according to a logarithmic function. Cable losses are usually calculated and specified for the highest frequency carried (greatest loss) on the cable.

Cable Powering - Supplying operating power to active CATV equipment (for example, amplifiers) with the coaxial cable. This ac or dc power does not interfere with the RF information signal.

Cable TV - Previously called Community Antenna Television (CATV) . A communication system which simultaneously distributes several different channels of broadcast programs and other information to customers via a coaxial cable.

Cascade - The number of amplifiers connected in series in a trunk system.

Coaxial Cable - A single cable with two conductors having a common longitudinal axis. The center conductor carries information signals; the outer conductor (shield) is grounded for those signal frequencies to prevent interference. This shield is often made of a flexible foil or braid, or solid aluminum. The two conductors are separated by an insulating dielectric.

Cross Modulation - A form of signal distortion in which modulation from one or more RF carrier(s) is imposed on another carrier.

dB - Decibel.

Directional Coupler - A passive device used in cable systems to divide and combine RF signals. It has at least three connections: trunk in, trunk out, and tap. The trunk signal passes between trunk in and trunk out lines with little loss. A portion of the signal applied to the trunk in line passes to the tap line, in order to connect branches or outlets to the trunk. A signal applied to the tap line is attenuated and passes to the trunk in line, and is isolated from trunk out line. A signal applied to the trunk out line passes to the trunk in line, and is isolated from the tap line. Some devices provide more than one tap output line (Multi-taps).

Distribution Amplifier - A high gain amplifier used to increase RF signal levels to overcome cable and flat losses encountered in signal distribution.

Drop Cable - A flexible coaxial cable which connects a network tap to a user's outlet connector. Also called Drop Line.

Entrance facilities - The entrance facilities are where the intrabuilding backbone meets the local exchange carriers or interbuilding wiring within the building.

Equalization - A technique used to modify the frequency response of an amplifier or network to compensate for distortions in the communication channel. The ideal result is a flat overall response. This slope compensation is often done by a module within an amplifier enclosure.

Equipment room - The equipment room is an area within a building where major components of large voice or data communications systems are housed. Equipment rooms are distinct from telecommunications closets due to the nature or complexity of equipment they contain.

F Connector - A standard, low cost, 75-ohm connector used by the CATV industry to connect coaxial cable to equipment.

Filter - A circuit that selects one or more components of a signal depending on their frequency. Used in trunk and feeder lines for special cable services such as two-way operation.

Flat Loss - Equal signal loss across the system's entire bandwidth, such as that caused by attenuators.

Flooded Cable - A special coaxial CATV cable containing a corrosion resistant gell between the outer aluminum sheath and the outer jacket. The gell flows into imperfections in the aluminum to prevent corrosion in high moisture areas.

Forward Direction - The_direction of signal flow in a cable system that is away from the CRF or headend.

Frequency - The number of times a periodic signal repeats itself in a unit of time, usually one second. One Hertz (Hz) is one cycle per second. One kilohertz (kHz) is one thousand cycles per second.

Headend - The facility that contains a cable system's electronic control center, generally the antenna site of a CATV system. It usually includes antennas, preamplifiers, frequency converters, demodulators, modulators, and other related equipment which receive, amplify, filter and convert broadcast television signals to cable system channels. It might house a host computer in broadband data communication systems. In two-way broadband systems, the headend holds at least the frequency translator.

High Frequencies - Frequencies allocated for transmission in the forward direction in a midsplit broadband system, approximately 160 to 400 MHz.

Highsplit - A frequency division scheme that allows two-way traffic on a single cable. Reverse path signals come to the headend between 5-174 MHz; forward path signals go from the headend between 232-400 MHz. No signals are present between 174-232 MHz.

Horizontal wiring - The horizontal wiring is the wiring between the telecommunications closet and the telecommunications outlet.

Horizontal wiring - The horizontal wiring organization as defined by this project is a "star" topology. This means that every office outlet shall be connected to a telecommunications closet. Most systems today can accommodate this type of structure. Current implementations of IEEE802.3/Ethernet (a "bus" structure) and 802.5/Token Ring (a "ring" structure) have been designed to handle star wiring through concentrators or multiport devices.

The distances in the horizontal wiring are defined to be 90 m (295 ft) with an allowance in the work area for an additional 3 m (9.8 ft).

The cables that are recognized in the horizontal wiring are:
[] 4-pair 100-ohm unshielded twisted pair (UTP) cable.
[] 2-pair 150-ohm shielded twisted pair (STP) cable.
[] 50-ohm coaxial cable (thin coax).

In choosing a medium for use in horizontal wiring the following recommendations are made.

There shall be a minimum of two telecommunications outlets at each work area location. These telecommunications outlets are defined as follows:

[] An outlet which shall be supported by 4-pair 100-ohm UTP cabling.
[] Another outlet which shall be supported by one of the following horizontal media:
    () 4-pair 100-ohm UTP cable;
    () 2-pair 100-ohm STP cable;
    () 50-ohm coaxial cable.

These recommendations are made with the intent of accommodating a diversity of user applications in order to reduce or eliminate the probability of requiring changes to horizontal wiring to meet future needs.

Insertion Loss - The loss of signal level in a cable path caused by insertion of a passive device. Also called Thru Loss.

Interbuilding backbone - This is the same as the intrabuilding backbone except it goes between buildings through the entrance facility. There are other special considerations for the building-to-building wiring due to environmental and distance specifications.

Intermediate cross-connect - This is the same as the main cross-connect except it is a level lower in the hierarchy of backbone wiring.

Intrabuilding backbone - The intrabuilding backbone Consists of the transmission media, cross connects and terminations for interconnecting telecommunications closets, equipment rooms and network interfaces.

Isolation Loss - The amount of signal attenuation of a passive device from output port to tap outlet port.

Low Frequencies - Frequencies allocated for transmission in the return direction in a midsplit broadband system, approximately 5 MHz to 116 MHz.

Main cross-connect - Where wiring systems join together, there need to be some interconnecting scheme. This is defined as a cross-connect. The cross-connect is the top level in the hierarchy of the building wiring. Termination and patching are the functions performed by the cross-connect.

Midsplit - A frequency division scheme that allows two-way traffic on a single cable. Reverse path signals come to the headend between 5-116 MHz; forward path signals go from the headend between 168-400 MHz. No signals are present between 116-168 MHz.

Modem - A modulator-demodulator device. The modulator codes digital information onto an analog carrier signal by varying the amplitude, frequency, or phase of that carrier. The demodulator extracts digital information from a similarly modified carrier. It allows communication to occur between a digital device (for example, a terminal or a computer) and an analog transmission channel, such as a telephone voice line.

Multi-tap - A passive distribution component composed of a directional coupler and a splitter with two or more output connections. See Tap.

Network interface - The network interface is the point of connection between the local exchange carriers equipment/wiring and the intrabuilding wiring/network.

Noise - Any undesired signal in a communication system.

Pad - A passive attenuation device used to reduce a signal's amplitude.

Return Loss - A measure of the degree of impedance mismatch for an RF component or system. At the location of an impedance mismatch, part of the incident signal is reflected back toward its source, creating a reflected signal. The return loss is the number of decibels that the reflected signal is below the incident signal.

Return Path - Reverse direction; towards the headend.

Signal Level - The RMS voltage measured at the peak of the RF signal. It is usually expressed in microvolts referred to an impedance of 75 ohms or in dBmV.

Slope - The difference between signal levels at the highest frequency and at the lowest frequency in a cable system. Also called spectrum tilt.

Slope Compensation - The action of a slope-compensated gain control. The gain of the amplifier and the slope of amplifier equalization are changed simultaneously to provide equalization for different lengths of cable; normally specified in terms of cable loss.

Splitter - A passive device that divides the input signal power from the forward direction into two or more output signals of less signal power. Input signals from the reverse direction are combined into a single signal and passed toward the headend. Splitters pass through 60 Hz power to all lines.

Station equipment - Station equipment resides in the work. This could be terminals, PCs, Systems or monitoring equipment.

Surge Arrestor - A device that protects electronic equipment against surge voltage and transient signals on trunk and distribution lines.

Tap - A passive device, normally installed in line with a feeder cable. It removes a portion of the signal power from the distribution line and delivers it to the drop line. The amount of power tapped off the main line depends on the input power to the tap and the attenuation value of the tap. Only the information signal (and not 60 Hz power) goes to the outlet ports. See also Multi-tap.

Tap Outlet - A type F connector port on a tap used to attach a drop cable. The information signal is carried through this port. The number of outlets on a tap usually varies from two to eight.

Telecommunications closets - The telecommunications closet is the area defined within a building to connect the intrabuilding backbone to the horizontal wiring. It can contain cross-connects, terminations and active or passive equipment to support the customer needs for telecommunications services.

Telecommunications outlets - The telecommunications outlets are the interconnection points between the horizontal wiring and the work area.

Termination - A 75-ohm resistor that terminates the end of a cable or an unused tap port with its characteristic impedance to minimize reflections.

Trunk Amplifier - A low distortion amplifier that amplifies RF Signals for long distance transport.

Trunk Cable - Coaxial cable used for distribution of RF signals over long distances throughout a cable system. Usually the largest cable used in the system.

Work area - The work area is defined as the location of the station equipment and work area wiring up to the telecommunications outlet. The work area wiring is nonpermanent and has special considerations in management.

*(All information from) -
Broadband Network Technology by Edward Cooper, Prentice - Hall, 1986 Englewood Cliffs, New Jersey.

APPENDIX D
SPECIFICATION CHECKLIST

This excerpt from the BICSI Telecommunications Distribution Methods Manual contains a checklist of specifications telecom designers can use to inform a construction contractor in detail of the methods and materials their plans require.....

PLEASE NOTE: OUR EFFORTS TO SCAN THIS DOCUMENT WERE NOT SUCCESSFUL. WE WILL TRY TO OBTAIN A MORE LUCID COPY OF THE DOCUMENT, AND WILL PROVIDE A COPY OF THIS DOCUMENT WHEN IT HAS BEEN SUCCESSFULLY SCANNED.

APPENDIX E

MEMBERS OCOTILLO RESEARCH/ACTION COMMITTEE ON TECHNICAL STANDARDS

Ken Baer	District
Jan Baltzer	District
Conrad Bayley	Estrella Mountain CC
Jerry Baxter	Paradise Valley CC
Diane Bondurant	District
Warren Buxton	Paradise Valley CC
Bill DeHaan	Mesa CC
Lionel Diaz	District
Gilbert Gonzales	Chandler/Gilbert CC
Manny Griego	Glendale CC
Bob Huddleston	Gateway CC
KC Hundere	Glendale CC
Bill Kiernat	Rio Salado CC
Juan Marquez	District
Sam Matar	Glendale CC
Don Shehi	District
Tom Trollen	Scottsdale CC
David Waters	District
Keith Worth	Scottsdale CC

APPENDIX F
SYMBOLS FOR VOICE/DATA/VIDEO

SYMBOL	
$\blacktriangleright_{VD}$	Voice/Data System
$\blacktriangleright_{V}$	Voice only
$\blacktriangleright_{D}$	Data only
$\blacktriangleright_{P}$	Public phone
$\triangleright_{E}$	Ethernet
$\triangleright_{F}$	FDDI
$\boxed{V}$	Video
$\boxed{A}$	Audio

Refer to standard C, this report, for specifics on jack configuration, cable, etc.. Coordinate selection of all devices with Information Technology Systems and Facilities Planning & Development staff for approval prior to issue of construction documents.

- All outlet boxes shall be 4" square by 2-1/8" deep (minimum) w/appropriate ring and 1" conduit to 6" above accessable ceiling.